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## NEURO-OTOLOGIC EXAMINATION IN CORRELATION WITH BRAIN SURGERY.*

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Nearly a quarter-century has elapsed since the so-called Barany tests of vestibular function became practically available to the medical profession of the United States. Though Barany's ideas about cerebellar localization were not new, and the actual physical responses to the tests had all been previously observed, his work correlated data, hitherto widely scattered, making a useful clinical procedure take the place of speculative theories.

The tests are applied in examination of what may well be termed *an additional special sense,* that is, *equilibration.* This may be defined as the perception of the position of the body in space. The seat of the end organ of the nervous mechanism by which this sense is conveyed is in the labyrinth, or inner ear. Without going into elaborate details as to the anatomy of this part of the auditory apparatus, I will recall to your minds the fact that in this portion of the temporal bone is to be found the cochlea, containing an elaborate

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arrangement of hair cells serving to aid in conveyance of sound waves to the auditory centers of the brain; and the semicircular canals, three in number, which open into a chamber in the bone, designated as the vestibule. These canals are filled with a fluid designated as the endolymph, and it is upon changes in the current and level of this fluid that our consciousness of the body's position in space is attained. As audition and equilibration are resident in the same organ, it becomes evident that the otologist will be immediately concerned with both senses. It will also be recognized that many of the clinical evidences of disease or derangements of the hearing apparatus will likewise be equally referable to disturbances affecting equilibrium.

*Evolution of the Auditory Apparatus:* In the evolution of man, hearing is the most recently developed of the special senses. Though we are in the habit of attributing to animals far more acute hearing than we ourselves possess, as a matter of fact auditory ability reached its peak of development in the human race. Because he could hear and be heard, man began to speak. It is pre-eminently the power of speech which raises him above the other animals, and has made possible all his subsequent psychic progress. Examination of the auditory apparatus of the higher mammals—man in particular—shows it to be a very highly specialized mechanism, even more so than that which supplies him with vision—this being usually thought of as the most complex part of the animal organism.

It has been noted by students of neurology that though hearing centers are located in both cerebral hemispheres, far greater loss of auditory power follows injury to the left hemisphere than if the lesion is on the right. This would seem to indicate a tendency toward unilateral centralization, a step in advance of the more general bilateral localization. This same tendency is observable in the speech centers of the brain. All other centers for special senses are bilaterally equivalent.

*Order of Development of Organs of Sensation:* The internal ear was developed before the cerebellum. We can distinguish an auditory apparatus only in the relatively higher forms of life, whereas the vestibular apparatus is to be found in the most primitive orders of creation. Invertebrates, as typified by the jelly-fish, for example, possess otoliths with appropriate nerve cells and ganglia, constituting a vestibule, but they have no structures comparable to the cochlea which would enable them to hear. Fishes, which do not need powers of audition such as are required by animals living in air, have no cochleas, but are equipped with a vestibular apparatus much more complete than that found in any class of invertebrates.

A little higher up in the life scale, in various orders of serpents, for example, a cochlea is in evidence, though it is very rudimentary. Birds are better equipped for hearing than are reptiles, but in them, likewise, the vestibule is far more advanced than the cochlea. With our comparatively recent acquisition of knowledge as to the part played by the semicircular canals in maintaining body balance it becomes clear why flying creatures have more need of equilibratory than of auditory apparatus.

Vestibular function demands nothing of the intellect. Though we say it is "instinctive" to right the body, or any part of it, when equilibrium has been disturbed, it is quite apparent that this "instinct" is much further down in the scale of intelligence than that which prompts the rabbit to *listen* for the approach of its enemies, or the cat to recognize the faint stirrings of a mouse, too far off to be detected by the sense of smell. Listening involves an intellectual effort and the exercise of a motor function far in advance of that which is sufficient to maintain equilibrium.

The tests of vestibular function are directed towards estimation of the condition of the inner ear regarded as the organ of equilibration, rather than of audition. So much was said and written by enthusiasts when the Barany tests first became available that their clinical value was greatly overrated at the outset. Hence they suffered the inevitable fate of other "fads." Many excellent clinicians, who might have found them highly useful within their limitations, either refused to try them at all, or abandoned them after inadequate trial, denying them the diagnostic value they undoubtedly possess. But, as usual, time has tended to equalize the claims of both enthusiasts and detractors. We now realize that extravagant claims were made for them, which could not be substantiated, but we have also come to value them at their true worth, to make allowance for the chances of fallacy, and to co-ordinate their findings with the history and the clinical observations, thus making of them a genuine diagnostic adjuvant, bound to become increasingly valuable as our knowledge of brain topography and pathology advances.

*Description of the Barany Tests:* The various tests to which the name of Barany is attached depend upon some form of stimulation, which irritates the fibres of the eighth nerve ending in the semicircular canals. By this stimulation the current of the endolymph flowing in the canals is changed from one direction to another, and impulses are conveyed to the brain through certain "pathways." Only one of these pathways has been histologically proven to exist, but clinical evidence has served to confirm much of the theoretical map-

ping which the warmest enthusiasts of Barany's method have carried out. In dealing with vestibular testing, however, it must always be kept in mind that scientific proof is lacking for many of the assertions of these enthusiasts, even though no one can deny that various normal reactions take place which cannot be explained in any other way.

Two methods are commonly employed: the *rotation* and the *caloric*. The reactions induced by the use of these methods are vertigo, nystagmus, nausea, staggering or falling, past-pointing, and eventually a certain degree of shock. These reactions are normal under the abnormal conditions induced by the tests. Turning the individual in a rotating chair will cause the endolymph to flow in a definite direction, in accordance with the direction in which the chair is being rotated. Douching the ear with cold water chills the petrous bone, and affects the flow of endolymph in a definitely understood way. If hot water is used the endolymph will flow in precisely the opposite direction, the resulting reactions being in accordance with this fact.

*Rotation:* A special revolving chair is employed, having a foot pedal which permits its being stopped suddenly when a certain number of revolutions has been made. To bring the horizontal canal parallel with the floor and permit proper flow of the endolymph, the subject's head is tilted downward about 30°. It is customary to turn first to the right, 10 times in 20 seconds, and note the reactions. Then turn to the left, the same number of revolutions in the same time. In either direction, the chair should be stopped suddenly when the tenth revolution is completed. When turning is begun the endolymph lags behind the rotation of the head, but very soon friction in the canal in which this fluid flows overcomes the initial inertia and the fluid "catches up" with the rotation of the channel in which it is flowing, and its current passes in the same direction. With the sudden stopping of the chair, the canal is halted, but the endolymph flows on until its impetus is again overcome by friction and the flow ceases gradually. If a normal subject is observed immediately the chair is stopped, he will display horizontal nystagmus to the side *opposite* that in which he has just been turned; to the left if the chair was turned to the right, and *vice versa*.

Should the normal individual now be turned more rapidly, say 10 times in 10 seconds, the head being still in the same position, he will be found to past-point in the same direction in which he has just been turned, the direction being the same no matter which hand he used in making the pointing test. A normal person can recognize the direction in which he is being turned while in motion, but with the sudden stopping of the chair he will think he is still being turned,

but in the opposite direction, this misapprehension lasting almost a half-minute. This is normal quantitative vertigo. The subject's eyes must be kept closed during all the tests. To ascertain the reactions from the other semicircular canals, the angle of the head is altered so as to bring the canal under examination into the horizontal plane, and the test is then carried out as before.

*Caloric Test:* The caloric test depends upon the fact that fluids when chilled become heavier and when heated, lighter. The fluid endolyph when chilled flows downward, if heated the flow is upward. Therefore, when this method of testing is employed the head must be so placed that the canal to be tested is in a vertical plane; that is, for testing the vertical canals the head is held upright; for the horizontal canal it must be held in a vertical position.

Thus if a normal individual be douched in the right ear with water at 68° F., while his head is inclined forward 30°, rotary nystagmus to the *left* will be in evidence, and he will experience a sensation of falling to the *right*, that is, the side which has been douched. He will also past-point to the right. Douching the left ear induces identical phenomena to the opposite sides. If water heated to 112° be employed, all the reactions will be reversed, as the endolymph will flow upward. In practice hot water is much more unpleasant for the subject to endure, so it is seldom or never used.

Definite physiological laws govern the reactions thus elicited. Nystagmus produced by vestibular irritation always has two components. The "slow" drawn out motion of the eyes, and the "quick" recoil. The quick component is the one usually designated when vestibular nystagmus is being dealt with, as this is the easier to observe. Purely ocular nystagmus is oscillatory in character, having no slow and quick components, and is largely under voluntary control. Vestibular nystagmus, on the contrary, is quite involuntary and is accompanied by vertigo and the falling reactions. In reports of vestibular examinations the expression, "conjugate deviation," is often used. This refers to the turning of both eyes in the same direction for the slow component and the absence of the quick component; that is, there is no quick recoil. It is a physiological law that for the slow component the eyes are always drawn in the same direction as the flow of endolymph; in other words, nystagmus is opposite to the endolymph flow. Vertigo is invariably opposite to the endolymph current's direction, while past-pointing and falling are in the opposite direction to the endolymph current.

*Past-pointing:* Possibly an explanation of what is meant by past-pointing may be in order. A normal individual with eyes closed can place his finger on a given spot, then raise his arm shoulder high

and, lowering the arm, find the same spot again without difficulty. After such a normal subject has been rotated, however, he cannot do this, but will point past the spot in a definite direction, in accordance with the direction in which he has just been turned. In conditions of disease past-pointing offers evidence of the location of the lesion, and is otherwise a valuable diagnostic sign.

*Diagnostic Uses of the Vestibular Tests:* It has already been said that though the diagnostic value of the Barany tests rests upon *assumption* that certain definite pathways exist in the brain, through which impulses from the vestibule are carried, clinical experience has so well demonstrated the possibility of detecting the location of a lesion which is interrupting such a hypothetical pathway, that otologic and neurologic diagnosis has been greatly aided by their employment. The tests often help to eliminate certain parts of the brain, so that the field of exploration is proportionately reduced. But perhaps the greatest potentiality of error in placing too much dependence upon them resides in the fact that all the reactions may be induced by *pressure* in an area at some distance from the actual seat of the lesion. This is their chief source of fallacy in dealing with brain tumor. A growth located in the middle fossa will so depress the brain substance into the posterior fossa as to induce reactions identical with those referable to the cerebellar area. A lesion of the pontine angle, the posterior fossa, or cerebellum might be suspected, because the depressed area will give like vestibular responses.

This leads us directly to the question, If one gets abnormal responses to the vestibular tests, is he justified in opening his patient's head? The answer to this is emphatically, no. Absolute dependence should never be placed upon these tests alone. The history and the clinical findings must be carefully correlated, and every effort made to disprove or confirm the evidence of the Barany examination. Its limitations should always be kept in mind. On the other hand, the subjects of brain surgery are always in a most desperate condition. We know only too well that death is very nearly certain if no relief is offered them. We must not stop too long for theorizing, and at the risk of being dubbed too radical, I must maintain that the otologic surgeon often has to take long chances. If a man were drowning in a swift current it would seem wiser to jump in and endeavor to pull him out at once, rather than to stand on the bank estimating whether the strength he is apparently exerting is sufficiently greater than the known strength of the river's current at the particular spot where he is struggling, to permit him to overcome it unaided.

*Practical Applications of the Barany Tests:* After more than 20 years' experience with the Barany tests, during which period I

have examined thousands of patients, I can unhesitatingly affirm that they are of the greatest practical assistance in diagnosis and should be an integral part of every otologic examination. Indeed, no such examination which does not include them should be called complete. They should never be omitted in any case of chronic otorrhea, or presenting head symptoms, be they ever so obscure. Headache, nausea, vomiting, especially if it be projectile in character, vertigo or even slight dizziness, staggering gait, inco-ordinate movements of the limbs, and all ophthalmologic manifestations, seen in conjunction with ear lesions, emphatically indicate the need of vestibular examination.

In the field of brain surgery there exists great difference of opinion as to the practical value of these tests. Many take the position that such patients are bound to die anyway, so why should we bother them or ourselves by applying an examination which is physically trying even to normal persons? But I would again emphasize that *an intracranial lesion is not properly investigated without the neuro-otological examination.* Formerly our only aid was the neurological examination. Later we came to place great dependence upon the findings of the ophthalmologist. Today the neuro-otological examination is proving of steadily increasing importance and value. The tests must, of course, be properly and scientifically performed by those who are properly equipped to carry them out. The technician need not himself be either a trained neurologist nor otologist, but he must be well grounded in the elements of both sciences, and in direct communication with practitioners of both otologic and neural surgery. This generally is possible only in large medical centres. Outside of these, qualified ear surgeons are far better equipped to do this work themselves than general surgeons are likely to be. I give this as an answer to a charge I have occasionally heard made that the ear men should not take it upon themselves to do brain surgery. Looking at it from my own point of view, I would say that the ear men do not want to do brain surgery; nor does anyone else. But inasmuch as mankind is subject to lesions of the brain which can only be relieved by surgery, and we, as physicians, are bound to relieve them if it lies within our power, it would seem that brain surgery will have to be done by someone, and who is better fitted for the unwelcome task than the aural surgeon? In the performance of this task, the vestibular tests are proving of very great practical assistance.

From the large number of case records in the files of the Otologic Clinic of Jefferson Hospital I have selected 12 to use as illustrations

of the points in regard to the vestibular tests which I have endeavored to make clear. As all data not directly related to the vestibular examination has been omitted from these case reports, I will preface their presentation by saying that it is of the highest importance to obtain a complete history before undertaking the tests. Any previous infections, eruptive fevers, system diseases or injuries to the head should be carefully noted and duly considered. It is essential to learn whether the symptoms complained of were of sudden or gradual onset. X-raying of the sinuses and mastoid should be previously practiced, and nose, teeth and tonsils explored for foci of infection and properly treated, should any such foci be found. The possibility of drug influence should be kept in mind, and previous ophthalmologic and neurologic examinations be at the disposal of the otologist. Inasmuch as a toxic labyrinthitis will induce responses from the vestibular tests similar in practically all respects to those manifested by brain lesions, every avenue leading to differentiation must be kept open, if a satisfactory diagnosis is to be reached.

CASE REPORTS.

*Case 1. Telangiectatic Glioma with Blockage of Sylvian Duct:* K. L., a boy, age 11 years, was referred for otoneurologic examination, Dec. 31, 1919. There was a history of constant headache and vomiting for the past week, and intermittent attacks during the past three years. For three days the child had been unable to walk. X-ray examination had showed a marked increase of intracranial pressure; also that the coronal sutures were separated and the convolutional depressions noticeable. The appearance of the X-rav plate suggested that pressure was more marked in the anterior half of the skull, especially along the line of the coronal suture. Neurological examination had showed bilateral choked disc and involvement of the external rectus of the left eye; right hand movements awkward, more so than those of left hand; awkwardness in movements of both legs, and a tendency to fall backward, to the left. No Babinski elicited. The tentative neurologic diagnosis was a lesion in the left cerebellar area.

*Otoneurologic Examination:* The responses to the hearing and tuning fork tests were normal; there was no nystagmus nor past-pointing, but as the patient was unable to stand, balancing tests had to be omitted. On right turning, vertigo was much exaggerated and a tendency to fall to the left, marked, nystagmus amplitude very large. The findings on right turning were the same, with falling to the right. Past-pointing was pronounced in both directions. Douching five minutes produced no nystagmus. When the vertical canals

of both sides were stimulated, past-pointing much impaired. Stimulation of both horizontal canals gave nystagmus of large amplitude, with exaggerated past-pointing. The variations in the responses to the tests suggested something in the vestibulo-ocular pathway acting like a cork in the neck of a bottle, changing its position when the head's angle was altered and producing uncertain and unequal pressure in the aqueduct of Sylvius. The summary is recorded as follows:

*1. a.* The labyrinths, vestibular and acoustic nerves are free; *b.* the medulla oblongata is not involved; *c.* the inferior peduncles are not involved.

*2.* The middle of the pons, corresponding with the middle cerebellar peduncles, is involved, the lesion being of sufficient size to involve both sides to the same degree. The eye muscle nucleus in the posterior longitudinal bundle is especially involved, while the middle peduncles are only secondarily implicated, and that to a less degree. The findings of the examination indicate a growth or other lesion exerting pressure from above and between the cerebellar hemispheres and involving the vermis.

A cerebellar decompression was done Jan. 10, 1920, the child dying four hours after operation. Autopsy revealed persistence of the thymus gland, with brain findings of encysted meningitis and blockage of the Sylvian duct. In the posterior portion of the left half of the cerebellum, involving the cornua and extending upon the dorsum of the cerebellum for a distance of 4 c.m., there was an area of softening, presenting a "mangled appearance." On the right the continuity of the surface was unbroken, but a similar softening was palpable. A cyst, 2.5 c.m. in diameter, occupied the area which would be surrounded by the circle of Willis, and pressed upon the optic chiasm and the corpora albicantia. The midbrain, which was enlarged and softened, encroached upon the cerebellum. The floor of the third ventricle had pouched to form a cyst, which had invaded the fourth ventricle. The lateral ventricles were enormously distended. The histologic diagnosis was telangiectatic glioma.

*Case 2. Tumor of the Left Frontal Lobe:* F. M., a man, age 44 years, was referred for Barany examination. There was a history of "fainting" due to "nervous breakdown." The vestibular examination showed past-pointing of abnormal duration, and an exaggerated nystagmus lasting 37 seconds, with very wide excursion; the eyes fairly danced in every direction. The compound nystagmus was the only striking finding of the examination. My report was as follows:

The medulla, pons and cerebellum are not involved: the left acoustic nerve is involved. Exaggerated nystagmus indicates neuaxial disturbance and suggests the existence of a cause of pressure, rather

than actual destruction of the nerve fibres. The exaggerated past-pointing would show the cerebellum to be intact, except that it is outward with the left arm. The impairment of the acoustic nerve would indicate a lesion nearly central with the greatest amount of pressure on the left side. The fact that the patient falls spontaneously to the right and backward also suggests a lesion exerting the greatest pressure on the left side.

This patient was later operated by Dr. Frazier, and I was informed by Dr. Burns that an inoperable tumor was found in the left frontal lobe.

*Case 3. Glioma of the Right Cerebellar Lobe:* M. S., a married woman, age 25 years, mother of three children, gave a history of first noticing difficulty in walking after her third confinement, in which labor had been normal. She had headache and was dizzy; was unable to see out of the left eye, but never saw double; there was loss of power in right arm and leg; loss of sensation and expression on the right side of face, and some impairment of hearing in the right ear. When she came under examination the patient had slight headache and was unable to walk, or to see with the right eye. X-ray examination had shown erosion of the sella turcica and disappearance of the anterior and posterior clinoid processes. There was increase in the markings of the convolutions, apparently due to increased intracranial pressure. In the opinion of the Roentgenologist there was a lesion of the pituitary body. Ophthalmic examination (Dr. Shannon) showed paralysis of the external rectus, and nystagmus on external rotation to the right and upward. In both eyes the media were clear, disc pale and edematous, arteries contracted, but no hemorrhage nor white spots. My analysis of the findings of the Barany examination was as follows:

The spontaneous spastic movements of the right leg and foot, the ataxic movements of the right arm, the pronounced diadokokinsia of the right arm and hand, with the "broomstick fall" in the pelvic girdle movements, all suggest involvement of the vermis. The synergic movements of the right side might indicate involvement of the right lobe of the cerebellum. The spontaneous nystagmus in all directions, upward in particular, is pathognomonic of brain stem involvement, either by pressure or by infiltration. The paralysis of the external rectus of the right eye would point to involvement of the origin of the right abducens nerve. The prolonged exaggerated horizontal nystagmus, which is stimulated by rotation of the horizontal semicircular canals, is regularly present when there is involvement of the brain stem, which interferes with the muscle nuclei of

the posterior longitudinal bundle. Subnormal vertigo and absence of past-pointing are indicative of a lesion in the pathways of the vestibulocerebellocerebral tracts, at the point where these tracts emerge from Deiter's nucleus opposite the inferior cerebral peduncle, following their exit from the posterior longitudinal bundle. The fact that caloric stimulation of the right vertical semicircular canals and the right horizontal semicircular canals fails to elicit past-pointing, indicates involvement of the right side of the medulla oblongata, of the pons Varolii, of Deiter's nucleus and of the posterior longitudinal bundle of the right side.

The same stimulation applied to the left vertical semicircular canal and the right horizontal canal produces a rotary nystagmus from the vertical canal, and a horizontal nystagmus from the horizontal canal, both showing a slowly exaggerated roll of long duration. This would indicate the effect of pressure in causing irritation of the three eye-muscle nuclei in the posterior longitudinal bundle which control the eye movements. The pressure area would extend from the inferior to the middle cerebellar peduncles. The impaired hearing, the slight facial paralysis and the abducens nerve paralysis of the right side show that it is on this side (the right) that the greater pressure is being exerted. That the lesion extends as high as the crus cerebri would be indicated by the failure to past-point, as this is due to destruction of the vestibulocerebellocerebral pathways from all the semicircular canals.

These findings appear to me to indicate that there is extensive intracranial involvement of the brain stem, the vermis, and the right side of the cerebellum. This is most probably in the form of pressure, rather than infiltration of those structures. Necropsy on this patient exposed a glioma of the right lobe of the cerebellum.

*Case 4. Neurofibromatosis of the Meninges and Cranial Nerves:* E. G., a young woman, age 24 years, was referred for examination by the vestibular tests, Jan. 9, 1928. The complaint was loss of sight and hearing. She walked with the feet very far apart, apparently to aid in maintaining her balance, but was found to walk fairly well with the eyes closed, as she did not fall during this test. Continuous vertigo and tinnitus were present, and there was no response to either air or bone conduction. Both tympanic membranes were intact. To the rotation and caloric tests all responses were lacking or abnormal. There was no nystagmus on rotation, nor any past-pointing, and response to the caloric tests were entirely lacking. On the right deafness was absolute. The fact that oblique nystagmus upward could be elicited, as well as horizontal nystagmus

looking to right, to left and downward, ruled out a labyrinthine or end organ lesion. The complaint of tinnitus suggested involvement of the cochlea, but this seemed to be outweighed by the loss of sight and the spreading of the feet in walking, as these were strongly indicative of a lesion of the cerebellum.

Operation through the posterior aspect of the skull was undertaken, but failed to afford any relief, the patient succumbing on Feb. 7, a month after the Barany tests were performed. At autopsy a number of definite tumor nodules were in evidence at the base of the brain, the two largest being located at the cerebellopontine angle on either side. These pressed upon the pons anteriorly and upon both cerebellar lobes. The tumor on the left was the larger of the two, but both were adherent to the meninges and appeared to involve the nerve trunks. The third cranial nerve on the left side had a firm mass, about 3 m.m. in diameter, adherent to its trunk. The fifth cranial nerve on the right side, the right Gasserian ganglion, and right and left seventh nerves, all showed small tumors on their trunks near the cranial exit. The right eighth nerve was included in a large tumor, which extended into the internal auditory canal. The right ninth, tenth and eleventh nerves were included in a tumor mass extending into the right jugular foramen, with slight destruction of the surrounding bone.

*Case 5. Meningeal Endotheliomata:* E. M., a man, age 38 years, gave a history of ringing in the ears, beginning 18 months previously and coming to its greatest intensity after several days, at which time deafness on the right side became noticeable. There was dizziness on quick turning to the right side, or sleeping upon this side, and at times on stooping. Examined Oct. 28, 1928; both ears were normal to inspection, tympanic membranes intact and ossicles in good position. The hearing in the left ear was somewhat impaired; on the right deafness was far advanced, auditory acuity being about one-half that of the other side. Tinnitus was, however, much worse on the left side. The eyes showed marked impairment of vision; vision was entirely lost on the right, which showed a high grade optic neuritis; choked disc was present on both sides. In bringing the fingers of the right hand to the nose there was evidence of marked ataxia; the left arm was diadokokinetic—the failure to produce rhythm of motion characteristic of cerebellar disease. The gait was ataxic; the feet were kept wide apart in walking and the tread was halting and uncertain. When the patient's body was bent backward or from one side to the other, the characteristic "broomstick fall" was induced. Spontaneous nystagmus was noted; vertical upward, and horizontal to right and left.

On caloric stimulation of the right vertical canal rotary nystagmus was induced, but no past-pointing; of the horizontal canal of the same side, upward nystagmus without past-pointing. On the left, no nystagmus nor past-pointing followed stimulation of the vertical canal; upward nystagmus, but no past-pointing resulted from stimulation of the horizontal canal. On rotation, nystagmus and past-pointing followed turning in both directions. These manifestations led to the conclusion that a lesion existed on the floor of the brain, apparently central, both sides of the middle area being affected, although not to the same degree. I believed the lesion to be intracellular, involving the upper part of the pons, the vermis, the third and fourth ventricles, and the aqueduct of Sylvius. I reached this conclusion by comparison with Case 1, in which a cyst of the Sylvian aqueduct exerted unequal pressure. This patient said his sight improved when his head was fixed in extreme extension.

The operative report on this patient is not available, but from the autopsy record made on Nov. 13, 1928, the following findings are taken: On removing the skull the dura was found adherent to the brain in a number of places, and was markedly thickened with innumerable small, circumscribed, firm nodules protruding from the internal surface. These varied from the size of a pinhead to 1¼ c.m. in diameter. There were two large, firm tumors at the base of the brain, one adherent to each cerebellar lobe, anteriorly, near the cerebellopontine angle. That on the left was larger and caused pressure upon the pons. Another smaller tumor mass lay on the floor of the anteroposterior fissure between the frontal lobes. In the dura at the base of the brain were numerous small tumor masses, which had induced pressure necrosis of both temporal and sphenoidal bones. A small tumor pressed upon the optic nerve at its point of entrance to the right optic foramen. No tumors were found in the brain substance proper. The histologic diagnosis was endotheliomata of the meninges.

*Case 6. Endothelioma of the Dura:* A. O'D., single woman, age 30 years, gave a history of chronic otorrhea with pain in the left mastoid. For the past two years the vision had been impaired, and during the four or five months immediately preceding, the left eye had bulged noticeably. Within a week or two the right eye had also become prominent. Hearing in the left ear had been impaired since an attack of scarlet fever at the age of 24 years. For four months there had been mastoid pain and free discharge on the left side Recently there had been severe frontal headache, with attacks of dizziness, but no vomiting. For the last fortnight the patient had

been unable to walk because of dizziness. She was brought in for examination, slumped down in a wheel chair, and if set on her feet fell backward and slightly to the left.

One portion of the X-ray report related that there was a sclerotic otitis or an endosteoma of the frontal bone; also a thickening of the middle fossa of the skull and irregularities in the region of the sphenoid sinuses. The ophthalmologist reported bilateral choked disc, with tortuous arteries giving evidence of secondary atrophy. This eye condition was so interesting in view of the final outcome of the case that I made use of a colored plate of the retina in my textbook[1], which was in course of composition at the time this patient was first seen.

The vestibular examination showed spontaneous nystagmus, looking both up and down, and to right and left. The patient fell backward and to the left whenever she attempted to stand unaided. On rotation to the right there was no past-pointing; nystagmus for 12 seconds, falling to the right resulted from effort to touch a given point, no matter which hand was used. Rotation to the left gave good nystagmus for 16 seconds, past-pointing to left for six inches with the right hand. The left hand did not past-point. Caloric stimulation of the right ear gave a few seconds of nystagmus; no past-pointing with the right hand; six inches past with the left hand. With the head back there was horizontal nystagmus and past-pointing six inches to the left with the right hand.

A radical mastoid operation was done on the left, and at this time there was a foul odor noticeable, which to my mind suggested malignancy, although the comparative youth of this patient made it seem doubtful. The roof of the mastoid was so necrotic that the removal of practically all of the floor of the middle fossa was necessitated. The dura showed many veins engorged and greatly inflamed. The patient survived but a day, and the postmortem report on the specimen removed from the auditory canal was endothelioma of the dura. In this case the findings of the vestibular tests were of little aid in ascertaining the diagnosis.

*Preoperative Diagnosis:* Cerebellar abscess. *Final Diagnosis:* Malignancy of the petrous bone.

*Case 7. Fibroma of the Cerebellopontine Angle:* M. A., a married woman, age 46 years, gave a history of left occipital headaches since an attack of pleurisy and congestion of the lungs, 18 months before. These headaches were increasingly frequent and severe, and were accompanied by dizziness and ringing in the ears. During the past two weeks all the symptoms were exacerbated, deafness in the

left ear had taken place, and the vision was dim, with an appearance of black spots before the eyes.

Examination disclosed retinal hemorrhages on both sides, with choked disc on the left. The right side of the face showed slight palsy, with skin sensation somewhat diminished. The left ear showed its canals and membranes congested and the malleus dislocated posteriorly.

Turning was not attempted because of the patient's desperate condition. She showed spontaneous nystagmus to right and left, and to the side past-pointing from four to six inches. Douching the right ear produced a conjugate deviation to the right, followed by horizontal nystagmus of wide amplitude, if lying down. Sitting up, there was no nystagmus. The patient died within 72 hours and autopsy showed a large, firm tumor at the left in the cerebellopontine angle. A nerve was adherent to this mass, but it could not be determined whether it was the sixth or eighth nerve. Histologically the growth proved to be a fibroma.

*Case 8. Glioma to the Right of the Cerebellopontine Angle:* C. R., a youth, age 22 years, gave a history of excruciating occipital headache for the past two months, with occasional vomiting and vertigo. A submucous resection had been done three weeks before, but had in no way relieved the severity of the headaches. The ophthalmologist's report was of marked choked disc on the right; bilateral optic neuritis, and inco-ordination of the limbs, which suggested a left cerebellar lesion, though this was in a way counterbalanced by the left eye ground findings. Spontaneous nystagmus developed when the eyeballs were rotated either up or down or from right to left. The Barany findings indicated that a lesion existed on the left side of the cerebellum, but was large enough to involve the right side, presumably by pressure. The patient died suddenly nine days after the Barany tests were applied, and at autopsy a tumor measuring some 4 c.m. in diameter was found to the left of the cerebellopontine angle.

*Case 9. Arachnoidal Cyst of the Right Cerebellar Hemisphere:* J. R., a young priest, had a history of illness dating about three weeks back. It had begun with great somnolence, occipital headache and mental stupor. Neurological examination showed some loss of co-ordination, and delayed reaction to pain, temperature and touch. The ophthalmologic examination showed nothing of diagnostic importance, insofar as the mental state was concerned. All the examiners of the special senses who saw this patient spoke of his "wooden" expression. He complained that vision in the right eye was

blurred; that he could not count fingers at one foot; also that vision was double. The eye report was ophthalmoplegia externus bilateralis, with filling of the physiologic cup of the right eye. There was no evidence of intracranial pressure. The X-ray report on the skull was likewise negative.

After undergoing the Barany tests, the following report was made concerning this patient: Spontaneous vertical nystagmus upward indicates brain stem involvement. The limited eye movements, the fixed dilated pupils suggest ocular palsy. The spontaneous past-pointing and ataxic movements of the right arm indicate interference with the co-ordinate movements. The spontaneous backward falling, the limitation of the side-to-side pelvic girdle motion, suggest pressure on the vermis. The exaggerated, prolonged, mixed, perverted nystagmus on rotation to the right would appear to indicate brain stem irritation. The tendency to slight conjugate deviation of the eyes on turning to the left may be due to an impaired impulse reaching to the cerebral cortex. The medulla, pons, longitudinal bundle, peduncles and seventh and eighth nerves do not appear to be involved. Because it was impossible to stimulate the inward pointing centre of the right arm by turning, or caloric tests with either heat or cold, a lesion involving the posterior fossa seemed likely; either direct or by pressure of the inward pointing centre of the right cerebellar hemisphere. Operation disclosed a cyst in the right cerebellar hemisphere, which was successfully drained; about six ounces of fluid was estimated by the surgeon.

NEURO-OTOLOGICAL TESTS.

*Case 9:* J. R. Before operation, chief complaint was: *1.* Irresistible sleep for three or four days. Awakened with difficulty. *2.* Continuous severe occipital headache. *3.* Bilateral dilatation of the pupils. *4.* Unable to walk without assistance.

*Spontaneous Nystagmus: 1.* Unable to look to right. *2.* Unable to look down; there occurred a rapid vertical upward nystagmus.

*Spontaneous Past-pointing: 1.* Persistently three inches to right with right arm; touch with left. *2.* Persistently two inches above left. *3.* Persistently two inches overshoots nose, right. *4.* Persistently two inches above nose, left.

*Spontaneous Falling: 1.* Head turned to right or left, falls back. *2.* Pelvic girdle movements; "broomstick fall."

*Stimulation: Rotation to the Right: 1.* Mixed nystagmus, 35 seconds. *2.* Vertigo normal in duration but wrong direction. *3.* Past-pointing exaggerated with right arm; normal left. *Rotation to the Left: 1.* Conjugate deviation at first, followed with normal nystagmus. *2.* Vertigo increased. *3.* Past-pointing, none with either hand.

*Caloric, 68°: Right Vertical Canals:* 1. Nystagmus normal. 2. Past-pointing normal. *Horizontal Canals:* 1. Nystagmus normal. 2. Past-pointing normal. *Left Vertical Canals:* 1. Nystagmus normal. 2. Past-pointing, wrong direction. *Horizontal Canal:* 1. Nystagmus normal. 2. Past-pointing, wrong direction.

*Note:* This suggests interference with inward pointing centre with right arm.

*Caloric, 112°: Right Vertical Canals:* 1. Nystagmus upward. 2. Past-pointing to right instead of left, with right arm touched with left. *Horizontal Canals:* 1. Nystagmus normal. 2. Past-pointing to right, touched with left. *Left Vertical Canals:* 1. Nystagmus perverted and slow. 2. Past-pointing normal. *Horizontal Canals:* 1. Nystagmus oblique upward. 2. Past-pointing normal with right touched with left.

*Note:* No past-pointing in either direction with left arm from either vertical or horizontal canals.

*Case 9:* J. R. Postoperative, 14 months later. Chief complaint is: 1. Normal sleep. 2. No headache. 3. Pupils normal. 4. Normal walking. Spontaneous nystagmus, none. Spontaneous past-pointing, none. Spontaneous falling, none. Pelvic girdle movements normal.

*Stimulation: Rotation to the Right:* 1. Nystagmus normal. 2. Vertigo two-thirds normal. 3. Past-pointing normal, right arm; touched with the left. *Rotation to the Left:* 1. Nystagmus normal. 2. Vertigo one-half subnormal. 3. Past-pointing normal.

*Caloric: Right Vertical Canals:* 1. Nystagmus normal. 2. Past-pointing with either hand. *Horizontal Canal:* 1. Nystagmus normal. 2. Past-pointing none. *Left Vertical Canals:* 1. Nystagmus normal. 2. Past-pointing none. *Horizontal Canals:* 1. Nystagmus none. 2. Past-pointing none.

*Case 10. Right Cerebellar Tumor:* E. C., an unmarried girl, age 20 years, gave a history of dizziness and blurring vision, with difficulty in walking. For two years there had been increasing deafness on the right side. There had been occasional attacks of vomiting and occipital headache had been severe. She complained that the right eye was "weak," and the arm and leg of the same side seemed "heavy." These manifestations had been gradually increasing during the two year period, finally making it necessary for her to give up her studies at the university she had been attending.

On entrance to Jefferson Hospital this patient's station was poor, there was muscular weakness and reduced co-ordination, especially on the right side. The ophthalmologist's report was bilateral choked disc, the papilloedema being greater in the left eye. Spontaneous

nystagmus, both vertical and horizontal, was in evidence. Hearing on the right side was practically *nil*. Particular attention was given to the outcome of the Barany tests as the history supplied by the family physician mentioned an inflammation of the middle ear some years before and his diagnosis of the present trouble was toxic labyrinthitis. All the results obtained, however, strongly indicated the existence of a lesion at the pontine angle on the right side, which was in accordance with the ophthalmologic findings. Operation was attempted and a tumor uncovered in the precise location indicated by the Barany findings. The girl died an hour-and-a-half after the skull was opened, and no autopsy was obtainable. The correctness of the indications of the vestibular test results was, however, strikingly confirmed by the operative finding.

*Case 11. Lipoma of the Brain:* F. F., a man, age 55 years, gave a history of "nervous breakdown" 13 years ago, and operation for tumor of the sciatic nerve. He had been well from that time until the present illness began in the summer of 1930. There was then gradual loss of memory, confusion and slowness of speech, inability to recognize familiar objects and, finally, marked aphasia. When examined after admission to Jefferson Hospital he was found in a stuporous condition, unable to co-operate or give any information about himself. The abdominal reflexes were absent on the right side, but present on the left. Those of the extremities were present and normal. The limbs showed many small tumors scattered over the skin surface, fairly firm but not hard, and easily movable. The findings of the neurological examination were: *1.* Sensory aphasia; *2.* in-co-ordination of the right hand; *3.* slight loss of power of the right hand. The patient vomited occasionally but made no complaint of pain, nor appeared uncomfortable. The ophthalmologist found a hemorrhagic retinitis, and the consensus of opinion was that indications pointed to a brain tumor, though the X-ray of the skull gave no suggestion of the existence of any such lesion. Multiple cerebral tumors similar to those on the body was the tentative diagnosis. A nodule had been taken from the left forearm for biopsy, and was pronounced by the pathologist to be lipoma.

The results of the Barany examination were very unsatisfactory, owing to the inability of the patient to co-operate. This emphasizes one of this examination's very great limitations. There was no spontaneous nystagmus in any direction. In lateral movements the right arm fell below the left. The constant tendency in falling was toward the right, and the patient fell at once upon endeavoring to stoop. Though he vomited frequently, he did not do so after turning; his

past-pointing was too uncertain to be of any value. The impression gained from the very incomplete results obtained was that a lesion was present on the right side. With the meagre evidence obtainable it was decided to do a subtemporal decompression. The brain cortex was minutely examined but no tumor was found. The patient had a convulsion while on the table, and was returned to his bed in much the same condition as before. He failed rapidly thereafter and died on the fourth day postoperative.

*Case 12. Cysts of the Cerebellar-pontine Angle:* S. W., a married woman, age 46 years, came under my observation with a history of dizziness more or less continuous for the past five years; constant and most annoying tinnitus; severe headache lately increasing in intensity, and progressive impairment of hearing. All the symptoms had been accentuated since an attack of influenza suffered three years before. About the same length of time previously she had had a fall, striking the back of her head upon a step. This fall was not, however, due to dizziness. There was no history of suppurative otitis media. The headaches were described as "splitting," beginning at the back of the head and moving forward. They were usually, but not always, accompanied by vomiting. When examined her gait was noticeably unsteady. Standing with the eyes closed, she swayed slightly, and when attempting to turn around, her unsteadiness upon her feet was particularly in evidence. The teeth were in very bad condition. Pus was draining from a sinus on the chin caused by an abscessed tooth, and it was possible to pass a probe into this sinus all the way to the root of the tooth. The patient was referred to a dentist to have her mouth cleaned up, and was seen again 13 months later. At the second examination she complained of pains in the back of her head, of short duration usually, but likely to be accompanied by vomiting, which seemed to relieve the pain. These attacks often occurred before getting up in the morning. She claimed that she had a sensation as of falling backward. The right side of the face now had an "ironed out" appearance, and the eyelid of that side did not close as rapidly as that on the left, suggesting a beginning paresis of the facial nerve on the right. There was no paralysis of the eye muscles. Moderate nystagmus was present, with extreme rotation of the eyeballs, most pronounced in the lateral fields. The ophthalmoscopic examination showed no distinct evidence of brain pressure, and the vessels were apparently normal. The Roentgenologist reported that the skull was unusually vascular but so far as he could see there was no evidence of increased intracranial pressure, or other pathological appearances.

The first Barany examination was given on May 7. A second was given on June 8, one year later. The second time the findings made at first were noticeably increased, indicating that the lesion was progressing, although not with great rapidity. In testing the hearing the patient was hardly able to distinguish the tuning fork because of the "rushing" or "blowing" tinnitus which was practically constant. The results of the rotation and caloric tests indicated that some sort of lesion existed in the region of the cerebellopontine angle, although the symptoms might readily be caused by pressure in that region, induced by a lesion elsewhere located. The ophthalmoscopic and Roentgen ray findings, however, argued against there being pressure symptoms. There were nine dry taps of the spinal column. Operation was recommended, but was delayed for personal reasons, and because of intensely hot weather. The patient went to New York and while there suffered such an exacerbation of all her manifestations that the physicians who saw her urged immediate intervention upon the brain. The family being unwilling to have the operation take place in New York, obtained the consent of those attending her to return her to Philadelphia, but at the recommendation of these new consultants she was sent, not to Jefferson, but to another hospital, where operation was performed. I was, however, present at the operation, which disclosed three "blue" cysts lying near the pontine angle. The patient shortly succumbed to edema of the brain.

These case reports illustrate very fairly the range of usefulness which the Barany tests afford in an otologic practice such as mine. In many of the cases diagnosis would have been impossible without their employment. In one or two the drastic limitations of that usefulness are clearly shown, but this does not in any way detract from their value in the cases to which they are applicable. In closing, I wish to express my indebtedness to the Surgical, Neurological and Ophthalmological Departments of Jefferson Hospital for most helpful co-operation, and for the many opportunities given me to apply these tests to patients in these services.

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# REPORT OF A CASE OF ACUTE DIFFUSE LABYRINTHITIS.*

DR. LESTER MEAD HUBBY, New York.

Oct. 21, 1930: J. S., age 39 years, clerk. *Family history* negative. Had measles at age 4 years. No other illness.

In 1918, while in France, a shell explosion caused vertigo and deafness in left ear. Hearing came back gradually but never more than fair. There was a slight discharge from this ear for about two months.

In 1920 again had pain in left ear, followed by a discharge from the ear, lasting over a month.

In 1925 had a furuncle in the left ear, suggesting probability of a continuation of the previous discharge from the ear.

Four days previous to admission, developed heavy feeling in head, severe otalgia in the left ear, followed by severe vertigo, no aural discharge noticed. The vertigo was so bad that he did not dare to try to go to the hospital and could not walk without hanging onto something. No headache. After four days, resting at home, he was able to come to the hospital. The vertigo was still severe and he had to walk with care.

On admission, Oct. 21, 1930, there was a very slight purulent fetid discharge from the left ear, spontaneous second degree nystagmus to the right, tendency to fall to the left, and to fall in the direction of the slow component of the nystagmus on changing the position of the head, total loss of hearing in the left ear, eye grounds showed slight engorgement of veins. Heart, lungs and kidneys normal. Blood examination: Hemoglobin, 82 per cent; red cells, 4,850,000; leukocytes, 7,800; polys., 64 per cent; large lymphocytes, 34 per cent; small lymphocytes, 2 per cent. Blood chemistry within normal limits except that the uric acid was a little raised (4 m.g.).

*Rotational Tests:* Rotation to right 10 times in 20 seconds, no nystagumus. Rotation to the left nystagmus to the R. 10 seconds. Fistula test negative.

Caloric cold (68°) to the left ear produced no nystagmus in 4 minutes, caloric to the right ear produced nystagmus in 1¼ minutes,

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was negative. X-ray showed cloudy mastoid with far forward superficial sinus.

Diagnosis of subperiosteal abscess, right, of mastoid origin was made and simple mastoidectomy done on Dec. 9. Temperature was 103° (rectal) at time of operation. On incision of the periosteum there was a flow of yellowish, very foul smelling pus and a rather large cortical perforation was noted over the antral region. On opening cortex a large pathological exposure of the sinus was found, about the size of a dime. The sinus was very far forward and very superficial. There were granulations on the wall but no apparent thrombosis. The entire mastoid cavity was broken down. It was exenterated and a small surgical exposure of the sinus was made but no dura was exposed. Temperature subsided to 101° and patient looked satisfactory until the second day after operation, when his temperature jumped suddenly to 104.6° following a severe chill. Blood count showed 17,500 total white cells with 85 per cent polys. The following day the temperature again jumped suddenly to 105.4° after another chill. Blood count showed 13,000 white cells with 83 per cent polys. Blood culture taken at peak of temperature the day before was negative. Spinal puncture was done and clear fluid was obtained, with no increase in pressure. Examination of fluid in laboratory was negative, having five cells to the c.m.m.

Patient was taken back to operating room on night of Dec. 12 and internal jugular vein was dissected out by usual method, tied off and cut. The sinus plate was removed and definite pus was found under the plate, with granulations on the sinus wall. The sinus was packed off from above and below and incised. There was slow bleeding from below when plug was loosened. Cavity was packed with iodoform gauze.

Patient ran an irregular temperature for two days following operation, after which it dropped to normal and remained practically normal. No transfusions were done as patient rapidly improved and was discharged from the hospital on Jan. 7, 1931.

60 East 58th Street.

# CASE OF SIMPLE MASTOIDECTOMY FOLLOWED BY CEREBELLAR ABSCESS; OPERATION; RECOVERY.*

Dr. H. Clifton Luke, New York.

Tessie F., age 4 years, was admitted to the service of Dr. John R. Page at the Manhattan Eye, Ear and Throat Hospital on April 2, 1929, with a history of the left ear discharging for eight weeks following a nasopharyngitis. During this last week she had complained frequently of pain in her head and for two days prior to coming into the hospital had acted queerly, rolling her eyes to one side, while her head was frequently drawn backward and to one side. No vomiting or chills. Did not seem feverish but wanted to sleep a great deal.

On admittance the child appeared acutely ill. Head was drawn backward and to the left and the eyes showed definite rotatory nystagmus toward the involved ear (left). On standing, fell to the left. Mentally was dull and nonresponsive. A thick purulent discharge filled the canal. There was some sense of thickening and definite tenderness over the mastoid. The external canal was partially closed by edema. Pulse was 106. Temperature was 99.4°.

The child was immediately prepared and simple left mastoidectomy performed. There was a general softening of the cellular structure. A small dark necrotic looking area, which was not disturbed, was noted over the posterior part of the external semicircular canal. The sinus and dural plate appeared normal. There were no exposures.

During the next two or three days various examinations and tests were made. The eye grounds showed the vessels to be congested, but the disc was clear. Similar findings were reported on several occasions later, but a typical choked disc was never observed. With a noise apparatus in the right ear, hearing was demonstrated in the left or involved ear. The mastoid wound was irrigated with cold sterile water, which gave, after two minutes, a definite nystagmus to the right—thus proving the viability of the left labyrinth. Spontaneous nystagmus to the left was interrupted by movement in the opposite direction during this test, but was resumed as before shortly

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after its completion. These tests were repeated on several occasions later with the same findings. The fistula test was negative.

The neurological findings by Dr. Zabrisky at this time showed a fairly alert mentality; all tendon reflexes present but more sluggish on left side. Babinksi was negative. There was some slight rigidity of the neck. No facial weakness. A rotatory nystagmus toward the involved ear on looking to that side. Coarse jerks on looking to the right. A posterior fossa involvement was suggested.

*Laboratory Findings:* Blood count on admittance was 15,600; polymorphonuclears, 68 per cent; lymphocytes, 32 per cent. The total count diminished during the next three weeks to 9,000, but the differential count remained about the same. Spinal Wassermann was negative. The spinal fluid was slightly turbid and showed traces of albumin, globulin and acetone. Normal sugar content. Cell count, 290. Small lymphocytes, 80 per cent. Cultures of spinal fluid taken on several occasions were always negative. The cell counts gradually diminished at the end of two weeks to 4 per c.m.m. The intracutaneous tuberculin test was negative and also the result of guinea pig injection at the end of 14 days. Cultures from the mastoid wound at operation showed no growth after 24 hours.

During the following two weeks (to April 17) the child's general condition and symptoms remained about the same. Nystagmus was active toward the involved ear. Two transfusions had helped to maintain nourishment, as the appetite was rather poor. Irritable and complained of headache occasionally. No vomiting.

Following are a few chart notes up to May 3, when second operation was performed:

April 18: Child dull and rather stuporous. Very irritable when aroused. Hearing test of involved ear remains positive. On standing, falls toward the diseased ear.

April 21: Vomits. Cries out with headache at times.

April 25: Complains of headache. Reflexes more sluggish on left side. Muscular grip weaker in left hand. Has vomited. Nystagmus continues active to the left.

April 27: Several convulsive spasms, with vomiting on one occasion.

May 1: Eating poorly. Nonresponsive and irritable by turns. Rotatory nystagmus to both sides, most marked to left, on looking upward. Tends to fall to the left. Convergent strabismus at times. Left cochlea and labyrinth still responsive. Left leg and arm considerably weaker than right. Left arm gives some evidence of ataxia. The white cell count has increased to 17,500, with 68 per cent poly-

morphonuclears. Marked convulsive spasms. Pulse rate has dropped to 66, with some irregularity.

May 2: The day before the cerebellar exploration the child had a severe convulsion with vomiting. Pulse dropped to 60 at one time. Dr. Poe made the following neurological notes: Spontaneous nystagmus active to the left. Coarse jerks to the right. Deviation of tongue to right. Definite ataxia in left hand when finger to nose test is made. No aphasia. Increased patellar jerks. Abdominal reflexes present in all three branches. No Babinski. Sluggish reaction of pupil to light. Equal on both sides. Strabismus present. No ocular muscle palsies. Vertical nystagmus observed at one time. In standing or walking the child seems to fall to the diseased side, with weakness in the left foot, which might be looked upon as added evidence of ataxia.

Concluding, he says, "In view of the prolonged headache, hypersensitiveness, spontaneous nystagmus to the diseased side, increased patellar jerks, and occurrence of convulsion and vomiting, I believe this case involves intracranial disturbance manifest by pressure in the posterior fossa or cerebellum. Exploration would be advisable."

The following day a cerebellar exploration was made.

*Operative Notes:* The cerebellar dura was exposed by removing the sinus plate and the cranial wall for a distance of 3 or 4 c.m. posterior to the lateral sinus. The dura appeared to bulge and was definitely tense. Dr. Page's exploratory brain forceps was passed into the cerebellum through a small incision in the dura, made 1 c.m. posterior to the descending portion of the lateral sinus at about the point where it turns inward and forward toward the bulb. At a depth of 2 c.m. the instrument entered a large abscess cavity with a discharge under pressure of about 8 to 10 dr. of rather thin foul pus. A colloidin drain was inserted in the cavity. The wound was packed and left open.

A postoperative transfusion was given and the general condition was satisfactory. The chart notes indicate that there was a definite and progressive improvement from this time on. The temperature never went above 101.4°. Mental alertness has returned. No complaint of headache. Sleeps very well, Appetite voracious.

There was very little, if any, postoperative drainage from the abscess cavity. The drain was removed on the fourth day following an unsuccessful attempt to define the cavity by the injection of lipiodol into it for X-ray examination. Following this a small folded wire drain was inserted. This was promptly expelled, with the

formation of a small hernia at the site of drainage. Cultures from the abscess showed a pure culture of streptococcus viridins.

*Bedside Notes:* May 5: Nystagmus less pronounced and only toward the side of the lesion. Ataxia of the hand diminished. No deviation of the tongue.

May 14: No definite horizontal nystagmus today. Vertical movements seen occasionally. Ataxia of hand slight. No strabismus. Pupillary reaction prompt.

May 17: Occasional headache. No definite nystagmus. Nutrition slowly improving. Transfused. Grip in hands about equal. Eye grounds are clear. Normal mentality. The wound is clean. There is very small herniation at the drainage site.

May 25: Stands without swaying or falling with eyes closed. Ataxia and eye symptoms have practically disappeared except for a much diminished rotatory nystagmus to the involved side, which is not always demonstrable.

The wound site, because of the long period of drainage and the fact that it had been left wide open at the time of operation, was not only unsightly but offered inadequate protection to a rather large exposure of cerebellum. On June 8, therefore, five weeks after the cerebellar drainage, a plastic operation was performed. The retracted scalp flaps were freed for some distance around the wound and brought together to give an adequate covering and protection over the entire area where the cranial vault was deficient.

The child was discharged on June 18 with the wound closed and free of all objective and subjective symptoms, save a diminished rotatory nystagmus to the left by fixing to that side.

In review of the case it would appear, considering the nystagmus and other symptoms present on admittance, that a posterior fossa involvement was more or less definitely established at that time. Labyrinthitis was ruled out early, while the lateral sinus also remained free of infection. The infection probably reached the cerebellum through some more circuitous route.

It would seem to the writer that the delay of nearly five weeks after the simple mastoid operation before the cerebellar exploration may have been the deciding factor in a favorable outcome. During this period a valuable resistance was built up, while the infection became localized and definitely walled off. Thus it appears that at the time drainage was performed the relief of mechanical pressure was an immediate factor of more importance than any measures to avoid the dissemination of infection.

121 East 60th Street.

# MASTOIDECTOMY COMPLICATING CERVICAL POTT'S DISEASE. REPORT OF A CASE.*

DR. ARTHUR E. WARREN, New York.

*History:* On March 7, 1929, a surgeon in Manhattan Eye, Ear and Throat Hospital telephoned, asking me to see a case in the ear clinic, a woman whom he had treated for some years for sinus disease, whom he had seen a week before in his office, suffering from acute mastoiditis. He had advised immediate mastoidectomy. Not consenting to operation, this woman visited one doctor after another during the ensuing week in the hope that she might find someone who would cure her mastoiditis without operation. When she presented herself in clinic on March 7 she had developed a postauricular subperiosteal abscess on the right. The patient was 30 years of age, married, with no children; a machine operator in a garment factory.

*Chief Complaint:* Her chief complaints on admission into the hospital were pain in and discharge from the right ear for two weeks, and postauricular swelling for one week.

*Present Illness:* She stated that she had had a severe cold in the head for four weeks. Her cold improved under treatment but after two weeks she began to have severe earache in both ears. The pain in the left ear subsided but the right ear continued to ache until Monday, March 4, when a myringotomy was done at the New York Eye and Ear Infirmary. The discharge was scanty after the myringotomy but the pain became so severe as to keep the patient awake at night following the temporary relief given by myringotomy.

Stiffness of the right side of the neck and severe pain in the occipital region were marked at this time—of significance, as we shall see later on.

Impairment of hearing was present since the onset of the cold. Tinnitus was noted at the onset of the earache but cleared up after myringotomy. No vertigo was noted at any time.

The past history informed us that the general health had always been good. There was no history of serious illness nor injury. Six years before, after some treatment for sinusitis, four nasal operations and a tonsillectomy were done.

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Examination of the right ear showed postauricular edema obliterating the postauricular fold. There was pain on motion of the auricle and tenderness to pressure over the mastoid process. The posterior and superior canal walls drooped and there was a scanty mucopurulent, nonmalodorous discharge on the floor of the canal. The tympanic membrane was covered with thin white exudate and bulged posteriorly and superiorly. No pulsation was noted at any point on the drum. The left ear was negative save for a slight retraction of the tympanic membrane.

Examination of the nose showed the small turbinates, pale mucous membrane, malodorous pus and crusts on both sides which accompany atrophic rhinitis.

The throat was clear of tonsillar tissue, the pillars scarred and not symmetrical. There was dried postnasal discharge over an inflamed postpharyngeal wall.

The heart, lungs and physical examinations, except as before noted, were essentially negative. The rectal temperature on admission was 101.4°, pulse, 98, and respiration, 20.

*Laboratory:* The blood count showed 19,700 white blood cells, with 84 per cent polymorphonuclears. The urine was negative for albumin and sugar. The radiographic report was a 4+ involvement with some softening.

*Operation:* A right simple mastoidectomy done on March 7, the day of admission, demonstrated free pus under the periosteum, a perforation of the mastoid cortex near the posterior canal wall above the antrum, and a cellular mastoid broken down and filled with pus. The sinus plate was intact and no exposure of sinus was made, but a large area of dura over the middle fossa was exposed by the disease process. A culture taken of the pus at operation showed mucosus capsulatus and streptococcus mitis present.

After operation the temperature was irregular and reached 104° (rectal) on three occasions during the following month.

Blood cultures on March 13 and April 3 were negative. The blood count dropped from 19,700 white blood cells on March 7 to 10,000, May 22.

The discharge from the right canal stopped within the week after operation and the ear canal remained dry.

A tumor mass in the right cervical region below the mastoid wound developed and on March 23 this was incised and a small quantity of pus evacuated. On March 28 the mastoid incision was continued downward and a large amount of pus was liberated from beneath the sternocleidomastoid muscle.

On April 4 the patient received 600 c.c. of blood by transfusion.

The chief complaints from this period on were occipital headache and pains in the neck.

On April 8 pus was found and drained from beneath the right trapezius muscle. A sinus running posteriorly was discovered and incision was made in the midline below the level of the spine of the seventh cervical vertebra.

The patient developed a retropharyngeal abscess, which was incised on May 9. A very small amount of pus was obtained. On May 25 X-ray after injection of lipiodol showed the lipiodol going in a straight line toward the second cervical vertebra.

On account of the unhealthy granulation tissue which had filled the mastoid the entire cavity was explored on June 11. Spongy granulation tissue was removed. No additional cells were found. A sequestrum of the mastoid tip was removed.

On June 25 the retropharyngeal abscess was again incised. Two carious teeth were extracted at the same time.

The patient was discharged to the outpatient clinic on July 5.

Progress was satisfactory, the mastoid wound and right cervical region healing nicely. The patient continued to complain of pain in the neck and severe occipital headache.

On Aug. 13 the patient was readmitted to Manhattan Eye, Ear and Throat Hospital, a cervical abscess on the left side of the neck having developed. She was transferred to St. Mark's Hospital and on Aug. 14 operation revealed a large abscess cavity under the left sternocleidomastoid muscle. She was discharged from St. Mark's Hospital on Sept. 11.

On account of a retropharyngeal mass, X-ray photographs were taken at Manhattan Eye, Ear and Throat Hospital, Oct. 2. These X-rays confirmed the diagnosis of cervical Pott's disease.

Treatment was instituted for the latter at Ruptured and Crippled Hospital but the patient is reported to have died of Pott's disease in a tuberculosis hospital.

50 East 63rd Street.

# MODIFIED RADICAL MASTOID OPERATION, FOLLOWED BY RADICAL MASTOID OPERATION WITH SEVERE INTERCRANIAL SYMPTOMS. CASE REPORT.*

Dr. John McCoy, New York.

Miss E. D., age 28 years, on Nov. 8, 1930, gave a history of discharge from her left ear for 10 years. She says her hearing in that ear appears to be as good as it is in the right ear. She said her teeth were O. K., smokes about 20 cigarettes daily, has never had rheumatism, her tonsils have never been removed. She says she has an urticarial condition, for which Dr. Fordyce blamed the ear. Examination of her ears showed the right ear to be normal, the left ear to have a perforation in the drum, from which a very foul smelling discharge was coming.

Her tests of the vestibular apparatus showed them to be normal. Examination with the audiometer showed that she had a loss of 7.5 per cent sensation units in the right ear, and 21 per cent in the left ear. A modified radical operation was proposed to her and at the same time removal of her tonsils.

This was done on Nov. 29, when she remained in the hospital about eight days. She complained of headaches after this operation while coming to my office for dressings three times a week. So finally, on Dec. 27, a radical mastoid operation was performed upon her. The operation disclosed that she had an area of dura exposed over the tegmen tympani. Following this operation she left the hospital in a week, but still complained of her headaches getting more severe. I sent her to a neurologist, who claimed that she had choked discs in both eyes and that she had a partial Babinski, so I accordingly sent her into the hospital again for the purpose of a spinal tap and also to have the neurologist examine her. While she was at the hospital the spinal tap showed that she had a pressure of 20, the normal being eight, that she had a modified Babinski, that she had an enlargement of the veins in both eyes to the outer side of her discs and that she had apparently a loss of pressure sensation in her

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right hand, as she was able to grasp more with her left than with her right hand. When the headaches occurred her pulse would sink as low as 50. The neurologist was of the impression, which later proved to be correct, that her symptoms were due to her increased spinal pressure and that her increased spinal pressure was due to a localized meningitis. She remained in the hospital about two weeks, having another spinal tap about four or five days later. During this time her symptoms gradually grew better and she left the hospital at the end of about two weeks, to come to my office for dressings. Again she complained of the severe headaches, but we continued with the dressings and sent her to see the neurologist about the latter part of February. He reported that her neurological symptoms had disappeared and I am very glad to report that her ear today is perfectly dry.

730 Fifth Avenue.

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## FIBROSARCOMA OF DURA, MIDDLE FOSSA. RADICAL MASTOID OPERATION. CASE REPORT.*

DR. EDGAR M. POPE, New York.

A. C., male child, age 3 years, admitted to hospital, Feb. 12, 1925. *Previous History:* Negative. *Present History:* About four weeks prior to admission to hospital the parents noticed a swelling behind and at the upper part of the left auricle. This had gradually increased in size. The child had not appeared ill. There was no history of aural discharge at any time.

Examination of left canal showed a scant, brownish, foul, purulent discharge. A large polyp, occluding the canal and extending almost to the external meatus, obscured any view of drum or middle ear. At the upper part of the mastoid process over the antrum area was

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a circumscribed semicystic mass about the size of a large olive. It did not appear attached to the overlying soft tissues.

The presence of the polyp in the external canal and the foul discharge indicated a chronic middle ear infection, and undoubtedly a chronic mastoid. We did not consider this swelling to be a new growth, but rather a cortical perforation with a cholesteatoma. It was with this in mind that we decided to do a radical mastoidectomy.

The usual postauricular incision was made through the soft tissues to the bone below and above to the tumor mass. The tumor was quite circumscribed and was not attached to the soft tissues. The tumor appeared fatty. The mastoid cortex was almost entirely eroded and the cells softened and necrotic. The sinus plate was eroded by disease just below the knee. No free pus was seen in the mastoid cavity. The mastoid cavity was exenterated.

The fatty tumor peeled away and left another rubbery, fibrous mass underneath. This mass was firmly attached to the dura by a broad base. The bone around the tumor was removed for about half-an-inch, revealing normal appearing dura. A section was taken from the tumor for biopsy. The antrum was found just below and internal to the tumor. The middle ear was not cleaned out as was originally planned. The wound was packed with iodoform gauze.

The gauze was removed in three days, and the tumor had fungated throughout the entire mastoid cavity. A week later a larger decompression was noted, and the child died in three days from meningitis.

The biopsy showed a fibrosarcoma, but from the section it was not possible to say just where it had arisen. It was not attached to the overlying soft tissues, but was firmly attached by a broad base to the dura. We were afraid to attempt excision of the tumor at the first operation, as the approach to the dura was through a dirty field.

4 W. 53rd street.

# BILATERAL PERCEPTIVE DEAFNESS OF LESS COMMON ETIOLOGY: 1. CINCOPHEN AND SALICYLATE. 2. ALCOHOL. 3. ATYPICAL OTOSCLEROSIS.†

Dr. V. K. Hart, Charlotte, N. C.

Quite often a patient is seen in consultation with a sudden and essentially complete deafness. Probably the most common cause of such a bilateral loss of hearing is syphilis of the central nervous system. I recently reported one such case with a negative blood Wassermann but positive spinal Wassermann[1]. Systemic lues will give deafness, but when profound it is usually due to direct invasion of the central nervous system with involvement of the meninges of the eighth nerve, the eighth nerve itself, or both. Mackenzie[2] calls this a neurolabyrinthitis syphilitica and distinguishes it from a luetic involvement of the labyrinth alone, which may occur particularly, he states, in late congenital lues[3]. The latter he designates labyrinthitis syphilitica tarda[4].

Apart from these specific inner ear lesions, however, there occur profound bilateral disturbances, the causative factors of which we are apt to overlook unless a careful history is taken, and thorough study made. A case is first reviewed in which cincophen and salicylate were the probable causes of deafness.

The patient, a white male, presented himself for examination, Dec. 22, 1930. *Chief Complaint:* Deafness.

*History Present Illness:* Four weeks ago began to have tinnitus and impairment of hearing in the right ear; shortly thereafter the left began to be involved. Now has much ringing in both ears and profound deafness. Has had no dizziness. Previous to onset had been taking aspirin, gr. 20, a day for six weeks. Stopped the aspirin after onset of deafness and took cincophen, gr. 5, fourth hour, with a total dosage of 120 gr. Total deafness followed. The drugs had been given for some rheumatic manifestations.

*Past Medical History:* An infected finger with sepsis last August. This required hospitalization. Developed lung and kidney complications but recovered completely and left the hospital with no involvement of hearing whatsoever. No other history of importance.

†From the Charlotte Eye, Ear and Throat Hospital.

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*Examination:* Robust male, age 30 years. No spontaneous nystagmust, past-pointing or falling. Nose and throat examination negative. Normal canals and drums. Blood pressure normal and eye grounds negative. No involvement of cranial nerves other than eighth.

*Ear Tests:* Bone conduction (Mackenzie fork, 190 d.v.): right, short 40 sec; left, same. Big C (by air): right, 0; left, 0. $c_4$ (by air): right, 0; left, 0. W. V.: right, 0; left, 0. S. V.: right, noise only; left, same. Minimal caloric: right, no reactions; left, same. Prolonged irrigation: right, slight abortive nystagmus for verticals and horizontals. No vertigo, past-pointing or falling; left, same.

*Turning Tests:* Right, slight transitory nystagmus only; left, same.

*Galvanic:* Kathode: right, to right, 6 ma; left, to left, 7 ma. Anode: right, to left, 6 ma; left, to right, 10 ma. Falling: right, present; left, present.

The tests were repeated three times over a period of several months, always with the same results. There was no improvement whatsoever.

*Laboratory:* Blood Wassermann, negative. Spinal fluid Wassermann, negative; cell count, three; albumin, 1+; globulin, 2+.

*Comment:* Much has appeared in the literature lately relative to the toxicity of cincophen. A letter was written to the author of one of these article, Rabinowitz[5], and his opinion asked concerning this patient. He replied that he had not encountered such a case, but that it was similar in many respects to salicylate poisoning and that outside of liver toxicity, cincophen and salicylate had much in common. In this connection Hanzlik and associates[6] showed the very close similarity of salicylism symptomatically to toxic symptoms of cincophen. Sixty-five per cent of their patients receiving variable doses of cincophen gave signs and symptoms of salicylism: headache, dizziness, fullness of head, and buzzing in the ears, with occasional nausea and vomiting. Therefore, in this case, it is not unreasonable to presume that the cincophen and salicylate acted conjointly.

Chemically, cincophen (atophan) is phenylcinchoninic acid.

Furthermore, the essential loss of all labyrinth irritability with residual galvanic functions points to an end organ lesion. This is what we would expect in a drug toxemia with no selective central nervous system action.

The next case, I feel, was a bilateral alcoholic neuritis of the eighth nerve, despite a previous luetic history. He was a white male, first seen Dec. 29, 1930. *Chief Complaint:* Deafness.

*History Present Illness* (this was only gotten with the aid of the family doctor as the boy could neither read nor write): Perfectly normal hearing until Nov. 17. No acute disease preceding. In one week difficult hearing progressed to complete deafness. Five days later had attack of generalized convulsions lasting 15 minutes. Did not bite his tongue or lose control of bladder or bowels. Had been drinking a great deal of "sugar" liquor just before this attack. States he drank large part of a quart daily for three weeks immediately preceding. (In other words, he had been drinking heavily at least nine days prior to any onset of ear symptoms.)

*Past Medical History:* Early last September was seen by family doctor with what he thought was a chancre. His Wassermann was returned as 4+. He was given mercury rubs and four injections of sulpharsphenamin. He was then not seen again until Nov. 22 (after onset of deafness) and was given three more injections of sulpharsphenamin and put back on mercury rubs. Doctor states he has been a bootlegger and has been drinking heavily for years.

*Examination:* Fairly well developed adult male, age 25 years. No spontaneous nystagmus, past-pointing or falling. No gross nose and throat pathology. Eye grounds negative. Normal canals and drums.

*Ear Tests:* Bone conduction (Mackenzie fork, 190 d.v.): right, short 35 seconds; left, same. Big C (by air): right, 0; left, 0; $c_4$ (by air): right, 0; left, 0. Voice: right, noise only; left, noise only. Minimal caloric: right, slight residual irritability; left, same. Eleven days later the labyrinths were for all practical purposes inactive to the caloric test, there being very slight abortive nystagmus only. There was no reaction to the galvanic, using 15 to 20 ma. of current.

*Laboratory:* Blood Wassermann, negative. Spinal fluid Wassermann, negative in all dilutions and cell count normal.

*X-ray:* Stereoscopic plates of skull were entirely negative for fracture.

*Comment:* I realize some men would still feel this was a luetic involvement, despite negative laboratory findings. My reasons for believing this alcoholic rather than luetic are these: 1. A negative spinal fluid. A negative blood Wassermann is not so significant, but most cases of sudden deafness of acquired syphilitic origin will give positive spinal fluid findings. Only rarely is lues seen with negative blood, spinal fluid and provocative Wassermanns; the so-called Wassermann fast patient. We have one such patient under observation now, with bilateral first and eighth nerve involvement, but the only one in our records of the past few years. Furthermore, a central

nervous lues sufficient to give convulsions as well as deafness would very probably give a positive spinal fluid. *2.* The prompt early antiluetic treatment which antedated his deafness only by 10 months. *3.* The failure to conserve any residue of hearing by later treatment. *4.* The definite history of excessive use of alcohol immediately prior to the onset of his deafness. *5.* The fact that both galvanic and caloric loss signified a high grade neuritis. A specific neuritis would in all probability be accompanied by positive spinal fluid findings. *6.* His convulsive attacks could easily have been part of an alcoholic encephalitis.

With his second treatment following the onset of deafness, a Herxheimer reaction must be considered. One would certainly expect, if this were such, a positive spinal fluid. It would also be improbable with treatment having already been given just two months previously.

With reference to a nonspecific neuritis of the eighth nerve, I reported some cases of nicotine origin in 1925[7].

The third case was in all probability a case of atypical otosclerosis. Though representing a bilateral marked inner ear involvement, he did not show the profound deafness of the two preceding cases. This type of case is frequently overlooked because of the absence of the classical findings of increased bone conduction, abnormal Gellé, normal drum and pink promontory. Therefore, the history and findings are reviewed.

He was a white male, first seen Sept. 22, 1930. *Chief Complaint:* Gradually increasing deafness for the past 11 years.

*History Present Illness:* Does not know exact date of onset of deafness, but it has gradually gotten worse over a period of years. No middle ear involvement at any time. No earache or discharge as a child. Rest of health has been good.

*Past Medical History:* Entirely negative. *Family History:* Six brothers and five sisters. Two sisters dead and three brothers dead. All died of acute disease or accidents. Two brothers have had the same gradual onset of deafness in younger life with no middle ear history and no explanation—also has one sister who became hard of hearing in younger life. Thinks mother and father had good hearing.

*Examination:* White, robust male, age 43 years. No spontaneous past-pointing, falling or nystagmus. No gross nose and throat pathology. Tubes patulous. Drums only slightly retracted and otoscopic examination shows no impairment of motility of ossicular chain.

*Ear Tests:* Bone conduction (Mackenzie fork, 190 d.v.): right, short 40 seconds; left, same. Big (by air): right, slightly short; left, same. $C_4$ (by air): right, short 25 seconds; left, same. W. V.:

right, 0; left, 0. S. V.: right, 3 feet; left, 3 feet. Audiogram: right, 29 per cent loss; left, 25 per cent loss. Minimal caloric: right, normal; left, normal.

*Laboratory:* Blood Wassermann, negative. Spinal fluid Wassermann, negative; cells, 8; no albumin or globulin.

*Comment:* The Vienna school has demonstrated pathologically the existence of an atypical otosclerosis. Such attacks primarily the cochlea rather than the usual sites of processus cochleariformis, horizontal canal, or the promontory. Consequently, there may not be fixation of the stapes, and an increased bone conduction, but a primary cochlear lesion with decreased bone conduction.

The absence of other explanation, the gradual onset in younger life, and the very suggestive family history justified the diagnosis here of an atypical otosclerosis.

*Summary:* A high grade bilateral perceptive deafness is commonly caused by central nervous system lues. However, there are other causes, and these should be carefully considered as well as syphilis. Among such nonluetic causes, drugs, alcohol and an atypical otosclerosis should be kept in mind.

No other case has been noted in the literature in which cincophen was a contributory cause to the deafness as in the first case reported.

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6 W. 7th Street.

# DEFORMITY OF EARS AND NOSE FROM LUPUS ERYTHEMATOSIS BENEFITED BY INTRACUTANEOUS T. B. INOCULATIONS: CASE REPORT.*

DR. EDMUND PRINCE FOWLER, New York.

B. M., Russian, age 55 years. Twenty-seven years ago patient developed "blisters" on the palmar surface of the fingers and hands. These "blisters" were of different degrees of redness and so painful that he could not lift anything. Local treatment at the Mount Sinai Dispensary for four months apparently cured the "blisters." Two months later a minor injury to the right side of his face from an ash barrel nail resulted in an abrasion, on top of which red spots formed. Some relief was attained by local treatment with salve. One year later, at the Beth Israel Hospital a diagnosis of lupus erythematosis was made (25 years ago). The condition had spread all over the face. Received electrical treatment (needling) to prevent spread of the condition, also X-ray, ultraviolet light, ice, acid and paraffin treatments, all without relief. At this time also, the deformities of the ears and nose developed. For 15 years he has had no treatment until the present. He came to the Manhattan Eye, Ear and Throat Hospital because he noticed lately he was getting deaf. Otological examination revealed a typical nerve deafness in both ears, 50 S. U., loss in left and a 65 S. U. loss in right ear. Bone conduction loss about coincided with the loss by air conduction (this was ten months ago). In childhood: measles, axillary adenitis. No ear trouble. Recurrent cough for the last seven years. Heavy smoker. Was in the Beth Israel Hospital 32 years ago for stomach trouble. Details uncertain, except that he was constipated and was treated with milk for a long time (ulcer?) No other illness.

*Family History:* Father died at age of 76, and mother at 67. Two sisters living, healthy; one died in infancy. One brother living and well. Two brothers died of T. B., one died nine years ago (patient never lived with this one). One cousin died of T. B. Patient married 34 years. Wife living and well. Four children living and well. One child died at the age of 18 of T. B.

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The Wassermann and all the intracutaneous tuberculin tests are negative. The hemoglobin has varied from 100 to 80 per cent. The leukocyte count has risen from 6,800 to 7,800. Polys. are 48 per cent. Small lymphocytes, 42 per cent. Large lymphocytes, 8 per cent. Eosinophiles, 2 per cent. The urine is negative. Blood calcium, 2.8 m.g. per 100 c.c. Otherwise the blood chemistry is negative. X-ray shows no active T. B. and little signs of any past trouble.

*Diagnosis:* Extensive lupus erythematosis involving most of the scalp, and all of the skin over the nose, face and ears in very disfiguring scars and deformities.

*Treatment:* Routine tuberculous inoculations (bacillary emulsion) were given beginning seven months ago. Result excellent as to health, and as a welcome surprise the skin over both cheeks, the scalp and over nose began to take on a healthy appearance, which has continued for the past two months. Patient states that no prior treatment produced any improvement. The question is, are the results of the inoculations specific and antituberculous in nature, or are they simply similar to those of any foreign protein? Lupus erythematosis is not generally considered tuberculous in nature. I leave further remarks to those who will discuss this case.

114 E. 54th Street.

## SCARLET FEVER — SINUSITIS.*

DR. FRANCIS V. GOWEN and DR. THOMAS F. GOWEN,
Philadelphia.

Since this is a scarlet fever year, as evidenced by the doubling of admittances at the Philadelphia Hospital for Contagious Diseases, and closure of schools in Philadelphia, it might be in order to say something about this disease, overrated by the public as a killer (as less than 5 per cent die), and underrated by physicians as a cause of sinusitis.

In looking up the literature on this subject I was surprised at the relative dearth of material in consideration of the great amount of scarlet fever and the supposed great number of serious sinus complications.

Referring to Ashby (The Diseases of Children, London, 1922), who speaks of the excoriation of the upper lip from the irritating nasal discharge; he suggests that sprays be not very poisonous. He syringes the nose and fauces with warm boric solution, or liq. sodae chlorinatae 1-20, or iodin solution 1 to 5. I don't; because of the danger of spreading infection to the ear by way of the Eustachian tube.

H. L. Lynah (THE LARYNGOSCOPE, 27:116, 1917) speaks of scarlet fever sinusitis causing an osteomyelitis resulting in the loss of the septum, causing a saddleback nose and the loss of one eye.

T. Hubbard, in Accessory Sinus Suppuration in Scarlatina, THE LARYNGOSCOPE, St. Louis, 22:74, 1912, states that sinus suppuration always exists in scarlatina that has purulent rhinitis. He speaks of death from progression of the disease to meningitis. (As yet I have not seen such a case.) He points out that chronic sinusitis may result, with complications. He further advises that all exanthematous diseases be regarded as precursors of sinusitis and that a rhinologist should treat such cases to prevent ear complications, and I would like to add to this that if proper treatment is instituted early enough, most other otolaryngological complications will be prevented. In discussing this paper, Dr. Henry O. Reik, of Baltimore, stated that physicians and rhinologists are ignorant of the relationship between sinus disease and the infectious diseases.

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Strackan, in the *Canadian Medical Association Journal*, November, 1924, out of 589 cases of scarlet fever, had eight acute accessory sinusitis cases, six purulent rhinitis cases and four catarrhal rhinitis cases. He states that the degree of throat infection, as Dean suggests, seems to depend on the presence or absence of tonsils and adenoids. I should like to add that my experience coincides with the principle laid down by Dean, that sinusitis in children is dependent on the existence of adenoids and that its cure is effected by removal of this cause.

Some very illuminating information comes from a German, named O. Baumler, author of Diseases of the Nasal Accessory Sinuses in Children in Scarlet Fever. He has made an exhaustive review of the literature and presents detailed evidence supporting certain conclusions, some of which are: *1*. The neglect of a subject in international medical conferences, causing complications in 20 to 40 per cent of scarlet fever patients. *2*. This complication appears in the first week of the scarlet fever. *3*. That scarlet fever sinusitis is no more dangerous than other sinusitis. *4*. That the course of the disease is favorable. *5*. That hemolytic streptococcus is the cause. *6*. The younger the child the greater the susceptibility to this complication. *7*. That the older the child the more guarded the prognosis, owing to the danger of frontal sinus involvement. *8*. He gives X-ray and other diagnostic information.

Dr. Warren Davis, of Philadelphia, has demonstrated the developmental anatomy pertaining to sinusitis in children so capably and efficiently that I will not touch upon it.

*The Routine Treatment at the Philadelphia Hospital for Contagious Diseases:* In the past 10 years 8,400 scarlet fever patients have passed through the wards while I have been on service; that is, from July 1 to Jan. 1, the milder period.

Dick serum is administered to all patients and when given early enough it lessens the incidence of sinusitis, by its marked action on the scarlet fever. In from eight to 24 hours after use of the antitoxin there appears a rapid subsidence of fever, malaise, delirium and rash; in the words of Dr. Place, of Harvard, the results are more dramatic than those following any other therapeutic measure. Numbers we cannot give at this writing. However, it does not cure established sinusitis, but serum from convalescent or cured patients probably will help.

All scarlet fever patients are given shrinking drops every two hours, consisting of ephedrin or adrenalin 1-8000, one or two drops in each nostril while the head is over-extended, hanging out over the

side of the bed so that the medicine runs up the lateral nasal wall under the middle turbinate and shrinks the nasal mucosa so that air will penetrate to the recesses which act as sites for the growth and development of colonies of bacteria and kill the bacteria, destroying the ideal culture media of darkness, heat and moisture. The shrinking solution is followed by an antiseptic solution, metaphen, acriflavin 1-1000 drops V. Lately, we have been using metephredin with good results.

*Treatment No. 2:* When sinusitis develops the opposed sides of the involved nostril are separated by shrinking the mucous membrane by the insertion of cotton-tipped applicators, wet with shrinking solution, thus providing air; this is continued until the middle turbinate region is reached and the same treatment is used here so that aeration and drainage of the ethmoid region is established. Then the nasal mucous membrane is sprayed or painted or packed with a suitable antiseptic. I prefer acriflavin 1-1000 or metaphen or metephedrin.

This treatment is repeated if congestion recurs. If indicated the antrum is washed and absolute alcohol or triodin ¼ and alcohol ¾, as recommended by Ridpath, left in. This may have to be repeated once or twice, seldom oftener.

*Treatment No. 3:* Sometimes sinusitis will progress further before I see it. The tissues over the ethmoid and frontal, as well as the eye, being puffed out, the nostril or nostrils entirely occluded, pulse and temperature high, and death seemingly in the offing.

Such cases after complete shrinking of the nostrils, we handle by removing the middle turbinate, washing out the antrum and removing the adenoids. The shrinking and antiseptic medication to the nostril are continued for the promotion of drainage. This treatment I have used in three cases this year, which all recovered.

*Treatment No. 4* consists, in addition to the above, in establishing external drainage at the site of puffiness, which so far I have not yet been compelled to do. Recently there have occurred two cases on my service, which I will report.

*Case 1:* M. B., age 20 years; two weeks after contraction of scarlet fever she developed ethmoiditis, maxillary and frontal sinusitis, as evidenced by pain and tenderness over the affected parts, recrudescence of fever and high pulse, headache, closure of right nostril and pus nasal discharge causing excoriation of the upper lip.

After shrinking the nasal mucosa, I found that she had a deflected septum high up which was pressing the middle turbinate against the lateral nasal wall, blocking the drainage from the frontal, maxillary

and anterior ethmoid. I instituted the above treatment, with four washings and instillations, her antrum was clear.

The ethmoid condition was more persistent, requiring prolonged treatment daily for five weeks before it was cured. She was discharged and advised to have a submucous resection.

*Case 2:* John S., age 4 years; third week of scarlet fever, semiconscious, fever, 104°; pulse, 160. Nose entirely closed on the left side, yellow pus exuding from this nostril. Left eye protruding. Tissues over left ethmoid and lower left frontal region swollen and red.

For anesthesia I administered whiskey and paregoric in small quantities and then opened the offending nostril with shrinking solution and removed the middle turbinate to aerate and drain the frontal and ethmoid regions.

Then I cracked over the lower turbinate against the lateral nasal wall with a dilator so as to admit a maximum of air and aid drainage. I removed a large infected mass of adenoid tissue the size of an English walnut, this to promote posterior drainage and to remove part of the cause of the sinusitis and a site of bacterial growth. Next day he was materially improved. He continued to improve and in about two weeks his sinusitis was cured.

In concluding this paper, I wish to express my indebtedness to the lectures, talks, conversations and demonstrations of my distinguished friend and teacher, inventor of operations, originator of many sinus disease treatment principles, generous teacher of hundreds of capable rhinologists, organizer of otolaryngological societies, clinics, staffs and departments, the distinguished professor of laryngology at the Graduate School of the University of Pennsylvania, the late Dr. Ross Hall Skillern; and when his epitaph is written, let it be inscribed on the heavens, "Skillern aerated the sinuses."

2033 Pine Street.

# RETROPHARYNGEAL ABSCESS. DIAGNOSIS AND TREATMENT.*†

DR. WILLIAM K. KISTLER, Philadelphia.

Retropharyngeal abscess is an abscess located between the posterior wall of the pharynx and the vertebral column; and while the most common seat of the abscess is the posterior wall of the pharynx opposite the oral cavity on one side or the other of the median line, it may be hidden above and behind the soft palate and require the rhinoscope to ascertain its outline. It may be situated opposite the larynx and only be seen in its entirety by direct examination with the laryngoscope, or it may be hidden by one of the posterior pillars of the pharynx. In view of these facts, it is only proper that all suspicious cases should be X-rayed, first to confirm the diagnosis, and secondly to determine the location and extent of the lesion. Greenwald and Messeloff, in the *American Journal of Medical Sciences*, 1929, discuss 55 cases of retropharyngeal abscesses in children, and state that every one of these cases was brought to their attention with the condition undiagnosed. Incidentally, they fail to mention the employment of Roentgenological means of diagnosis in a single instance. In the Bronchoscopic Clinics of the University of Pennsylvania the Pancoast-Pendergrass technique for the examination of the soft tissues of the neck is carried out. We have not time to describe this, but a detailed account can be seen in the *American Journal of Roentgenology and Radium Therapy*, March, 1930, under the title of "Roentgenologic Diagnosis of Diseases of the Upper Respiratory Tract in Children."

Chevalier Jackson gives as the important etiological factors in children spinal caries, and tonsillar infections in 90 per cent of the cases. There is a free communication from the tonsil to the retropharyngeal space through the loose tissues and lymphatics in this region in the young child. Infected, suppurating or caseating cervical lymph nodes and otitis are other frequent causes. Rhinitis and sinusitis have been mentioned as other less common etiological factors. In addition to the loose tissues and lymphatic distribution in the child, the connection of these lymph channels with several retropharyngeal lymph nodes is probably the most significant factor in

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the carrying of infection to this region from the various sources named.

In the adult the retropharyngeal tissues are thin and closely attached to the vertebrae, and are not conducive to the spread of infection from these sources. While perforating foreign bodies in the esophagus, such as pins, safety pins, glass and collar buttons, are well recognized causes of abscess in children, the most important causes in adults are probably from the lodgment of fish bones and other sharp mistaken articles of food.

In the ordinary case there is usually slight systemic disturbance. Chilly sensations may perhaps be complained of, but local symptoms are usually the first to attract attention. When the abscess is situated high up upon the pharyngeal wall, a sensation as of a foreign body causes almost constant hawking and spitting, while there may be present obstructed nasal respiration with more or less pain and tinnitus. When the abscess is opposite the larynx, dyspnea is a marked symptom. The overhanging of the posterior wall usually causes dyspnea, which may be so severe as to endanger the life of the patient. The child will want to keep its head back, due to the dyspnea caused by the overhanging of the posterior wall of the pharynx. In some instances the dyspnea is so great that a tracheotomy is necessary to save the patient's life. Sometimes the dyspnea is relieved if the tongue is brought forward with the laryngoscope, and a bronchoscope is inserted by the Gabriel Tucker method. By this method the abscess can then be incised and drained without danger of asphyxiation or aspiration of pus. An abscess in the pharyngeal wall opposite the oral cavity presents none of these later symptoms, unless very large. There may be slight rigidity of the neck, slight cough, and peculiar alteration of the voice. The pain, if any, is deep-seated and constant, usually increasing in intensity until the abscess ruptures or is opened.

Retropharyngeal abscesses that do not arise from diseases of the vertebral column may be divided into those of intrapharyngeal origin, and extrapharyngeal origin, a distinction of importance in determining what type of operation is to be employed. The former result from the spread of infective material from a tonsil through the pharyngopalatine arch into the lateral wall of the pharynx. Quite rarely they arise high up on the lateral wall of the pharynx as the result of inflammatory changes occurring in relation with a mass of adenoids.

The extrapharyngeal abscesses are the result of inflammatory changes occurring in the deep cervical glands leading to abscess

formation in the deepest gland of the set lying against the pharyngeal wall. As a consequence, the lateral pharyngeal wall is pushed inwards by a fluctuating swelling, which bulges into the cavity of the pharynx on one side. Intrapharyngeal abscesses should therefore be treated by incision through the mucous lining of the pharynx, and extrapharyngeal abscesses by external operation through the tissues of the neck. Usually cold abscesses caused by tuberculous caries are not operated. It is our purpose to discuss the treatment of intrapharyngeal abscess only.

Fig. 1. Retropharyngeal abscess in an infant, age 6 months. Glandular or tonsillar origin, four days' duration. Roentgenogram shows considerable retropharyngeal swelling, which pushes the trachea forward, angulating it.

The technique of Gabriel Tucker's method of evacuation of a retropharyngeal abscess by direct examination is as follows:[6]

"The location and extent of a retropharyngeal abscess is determined by local examination and X-ray studies. If the abscess is extensive it is usually accompanied by considerable dyspnea. The dyspnea is due to the bulging posterior wall of the hypopharynx obstructing the larynx and, if the abscess extends downward below the level of the cricopharyngeus, anteroposterior compression of the trachea may also produce dyspnea. When the abscess is to be evacuated the patient is placed in the bronchoscopic (Boyce) position with the head beyond the end of the table. No anesthesia, either general or local, should be used. If the dyspnea is increased by the Boyce

position, the head is allowed to remain below the table level. The direct laryngoscope is introduced and the base of the tongue and the larynx are lifted forward. If the patient becomes dyspneic the larynx is presented and a bronchoscope, which has been prepared previously and is suitable in size for the patient's larynx, is introduced through the laryngoscope. The laryngoscope is then removed, leaving the bronchoscope in position. The bronchoscope relieves the dyspnea and prevents aspiration of pus into the trachea when the abscess is evacuated. The laryngoscope is again introduced alongside of the

Fig. 2a. Retropharyngeal abscess in infant, age 11 weeks. Before evacuation. Large retropharyngeal swelling is pushing larynx forward, occluding breathing space. Child holds head in hyperextended position in order to relieve marked dyspnea.

bronchoscope into the pyriform sinus, usually the right, and the bulging posterior wall of the hypopharynx is exposed. A Jackson laryngeal knife is used through the laryngoscope to incise, in the median line, just above the level of the cricopharyngeus, a small opening into the abscess cavity. When pus is obtained a closed Mathieu forceps is inserted in the incision and the forceps opened, increasing the size of the opening into the cavity. A round-tipped aspirating tube attached to the suction apparatus is used to aspirate the pus from the pharynx

and introduced through the incision into the abscess cavity, evacuating the contents of the cavity by suction.

"In smaller abscesses where the bulging of the posterior wall of the hypopharynx is not so great and the trachea is not compressed the dyspnea will be entirely relieved by lifting the larynx and base of the tongue forward by the laryngoscope. The insertion of the bronchoscope is not necessary in these cases. With the tip of the laryngoscope back of the cricoid cartilage, lifting it forward, the head is lowered below the level of the table and the bulging posterior wall of the pharynx is incised in the median line just above the level of the cricopharyngeus. With the patient in this position the pus will

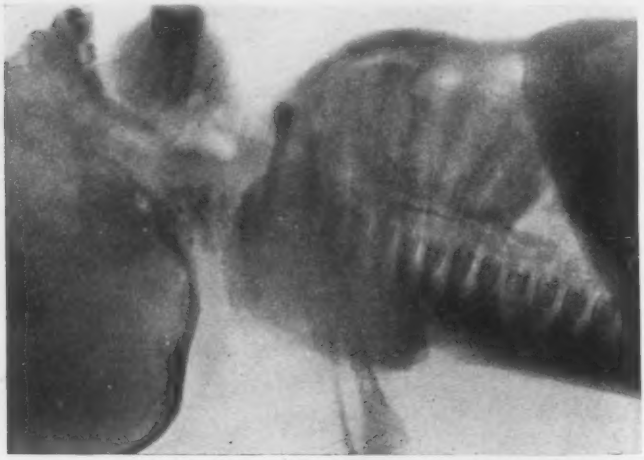


Fig. 2b. Same abscess after evacuation by direct method. Position of head normal. Slight retropharyngeal swelling due to inflammatory edema, which disappeared after a few days. Abscess completely evacuated.

gravitate into the nasopharynx, which will prevent aspiration into the larynx and trachea. Suction is used to remove the pus from the nasopharynx and the end of the round-tipped aspirator is introduced through the incision into the abscess, evacuating its contents.

"Occasionally repeated aspiration every eight to 12 hours during the first few days is required. The procedure is carried out without anesthesia and the aspirating tube can usually be introduced through the fistula that remains at the point of the original incision into the abscess cavity. The method has the advantage of: first, relieving dyspnea, thereby avoiding tracheotomy, that would otherwise be re-

quired in certain cases; second, it makes it almost impossible for the patient to aspirate the pus into the lung when the abscess is evacuated; and the third advantage is that if a foreign body is present it can usually be found and readily removed at the time the abscess is evacuated."

PRESENTATION OF CASES.

The first case presented is that of a female child, age 6 months. Three days before admission the mother first noticed a swelling in the baby's neck. Examination on admission showed the child to be breathing with considerable difficulty on both inspiration and expiration. There was very little indrawing at the suprasternal notch. Skin was quite pale. Mouth showed a mass of large glands on the right side just below the angle of the lower jaw. Child was having difficulty in swallowing liquids.

a. b. c.

Fig. 3a. Retropharyngeal abscess in a child, age 9 years, which developed five days after patient had fallen on broken glass, which perforated trachea and esophagus.
Fig. 3b-c. Same abscess after being aspirated three successive days. By direct method.

Roentgenologic examination showed considerable retropharyngeal swelling, which pushed the trachea forward and angulated it (see Fig. 1).

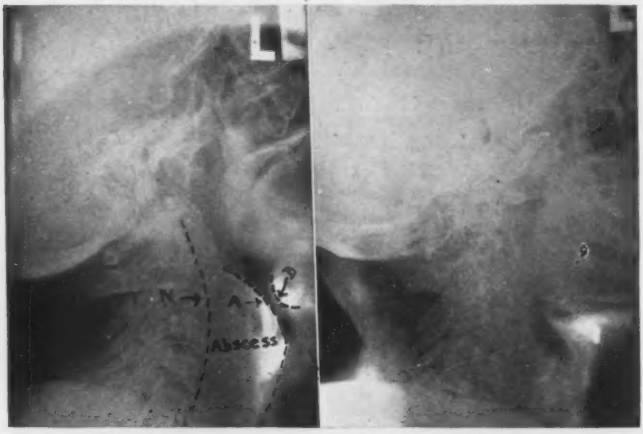
Direct laryngoscopic examination showed the posterior pharyngeal wall to be bulging forward and overhanging the larynx. On lifting the larynx forward with the infant laryngoscope, pus was seen coming from a point on the posterior wall at the level of the cricoid. The aspirating tube was inserted through the opening and a considerable quantity of pus was aspirated. The child's breathing improved immediately and she was able to swallow liquids.

The following day the general condition of the child was improved, the abscess was still draining a large amount of yellowish pus and the child was able to swallow liquids.

The second day after the primary examination another direct examination was made. There was found very little bulging of the posterior pharyngeal wall, which was inspected down to the cricoid level.

Roentgenologic examination showed the swelling to be diminished considerably. No indication was seen for further incision of the posterior pharyngeal wall and the child made an uneventful recovery.

*Case 2:* The second case is that of a female child, age 11 weeks. The child was admitted to the hospital of the University of Pennsylvania with a history of dyspnea of two weeks' duration. Examina-




a. b.

Fig. 4a. Large retropharyngeal abscess due to penetration of a fish bone. Posterior pharyngeal wall is pushed forward by large abscess from normal position, N, to dotted line, A, causing extreme dyspnea by occluding airway, A-B.

Fig. 4b. Same abscess after complete evacuation by Tucker's direct method. There is still some slight retropharyngeal swelling, due to inflammation.

tion showed child to be urgently dyspneic, with marked inspiratory retraction at the suprasternal notch and at the tip of the ensiform cartilage. There was some retention of secretion in the pharynx. X-ray examination showed a large bulge forward in the retrotracheal space (see Fig. 2a).

At this time the larynx was lifted forward with the laryngoscope. A bulging mass was found on the posterior pharyngeal wall. The center of this mass was incised and a considerable quantity of thick, whitish pus was evacuated with the aspirator. After evacuation the dyspnea was markedly relieved. Three days later the after-ray showed the abscess to be considerably diminished in size. No further

surgical treatment was necessary and the patient made an uneventful recovery.

*Case 3:* The next case is that of a child, age 9 years, who, one hour before admission to the University Hospital, sustained a stab wound by falling on a sharp portion of a glass bottle. The sharp portion of glass had passed through the trachea and esophagus. Three days after admission patient's temperature rose to 104°, there was marked difficulty in swallowing and marked dyspnea. On the fifth day a Roentgenogram showed a large retropharyngoesophageal abscess which was obstructing the larynx from above and compressing the trachea from below the level of the cricoid (see Fig. 3). The

Fig. 5. Large retropharyngeal abscess, elderly man; trauma from self-attempted passage of stomach tube, etiologic factor.

treatment consisted of passing a bronchoscope, which relieved the dyspnea at once. The abscess was then evacuated through the pharynx, by means of the direct laryngoscope used as an esophageal speculum. The posterior pharyngeal wall was incised just above the cricopharyngeal fold and an enormous amount of very foul pus and gas was evacuated. This was aspirated until the field was clean. It was necessary to aspirate the pus as it accumulated on three successive days. There was a gradual recovery, with only slight stenosis resulting from the tracheal injury[2].

*Case 4:* In this case the film shows an enormous retropharyngeal abscess due to penetration of a fish bone. The posterior pharyngeal wall is pushed forward from the normal position to the dotted line,

causing extreme dyspnea by occluding the airway. The larynx and trachea were displaced forward 4 c.m. by the large pus collection back of the hypopharyngeal wall. The bone was removed and the abscess aspirated through the mouth by means of the esophageal speculum. The after-ray shows the abscess to be very much diminished in size[1].

*Case 5:* In this case the film was made by Dr. J. G. Cohen at the Graduate Hospital (see Fig. 5). It is the case of an elderly man, who developed a large retropharyngeal abscess one week after patient attempted to pass a stomach tube to relieve an esophageal stenosis. The bronchoscope was inserted to relieve the dyspnea and the abscess was evacuated by means of the direct laryngoscope. A large amount of foul smelling gas and about 16 ounces of pus were evacuated, relieving the dyspnea and dysphagia.

In concluding, I would like to emphasize:

*1.* The importance of foreign bodies, especially sharp pointed, mistaken articles in food, as an etiologic factor of retropharyngeal abscess.

*2.* The importance of proper Roentgenologic examination of the soft tissues of the neck as a valuable aid to diagnosis; and

*3.* The value of endoscopy as a means of diagnosis and treatment, especially in cases of large abscess where there is marked dyspnea.

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7921 Germantown Avenue.

# International Digest of Current Otolaryngology.

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Dr. H. C. Rosenberger, Cleveland.

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The American Academy of Ophthalmology and Otolaryngology will hold its thirty-sixth annual meeting, Sept. 14-19, 1931, at French Lick, Ind. This year's program promises to be one of the best that has ever been presented.

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Wotzilka and Schramek, of Bokau bei Aussig, a. E., in the May, 1930, Monatsschrift f. O., R. and L., describe animal experiments on air currents through each side of the nose and the lungs. Their experiments show very clearly that inspired coal dust spreads in the same side of the lung as the nostril through which it was inhaled; only minimal amounts are seen on the other side of the lungs. The inspiration carries along two parallel currents from the choana to the bifurcation where each current then attempts to follow its own pulmonary lines.

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J. R. Page, of New York, in the *Southern Medical Journal,* January, 1931, presents an article on the indications and contraindications for operating on the labyrinth. He quotes some of the present day opinions from the literature and sent out a questionnaire to a number of prominent otologists. The answers were that 18 out of 27 thought that lumbar puncture was contraindicative in the case of diffuse labyrinthitis with middle ear suppuration.

The author reports a case where the German dictum, that acute labyrinthitis with a dead labyrinth should be operated, would have destroyed the hearing which later returned.

Page is of the opinion that the history should be of tremendous importance in making the decision to open the labyrinth. If the history suggests that the labyrinth has been dead for a long time, then it should be opened; but if it appears that the labyrinth has recently ceased to function during an acute attack, then it is safer to delay operation.

Benesi, of Vienna, in the May, 1930, Monatsschrift f. O., R. and L., describes a most interesting case of emphysema and nose bleed following tonsillectomy and adenoidectomy. A routine T. and A. was done on a 7-year-old child, and there was no bleeding following the operation until a few hours later when the operator was hastily called back. The child was bleeding from the right side of the nose while the left side was absolutely clean. Benesi decided that the bleeding had no connection with the recent operation. He attempted to have the child clear the right side of the nose by blowing; the child used some force but was unable to free the right side, and while attempting to blow his nose, suddenly noticed a swelling on the right side of his face which seemed to be localized in front of the ear and about the jaw. Crepitus was felt and diagnosis of emphysema was made. The child was put back under anesthetic and the pharynx inspected. There was no bleeding from the pharyngeal surface, but yet the right side of the nose was bleeding freely. Stryphnon powder was blown into the nostril and in a very few moments controlled the hemorrhage. The author explains the emphysema by the fact that certain pathways must have been opened by the adenoid operation which could not stand the pressure of forced nose-blowing.

The reported cases in the literature agree that the emphysema either breaks through the Eustachian tube or through the pterygo palatine fossi. The author concludes with a sincere request that all patients be forbidden to blow their noses following an operation on the pharynx.

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The following officers were elected at the annual meeting of the American Bronchoscopic Society, held in St. Louis, June 6, 1931:

President—Dr. Louis H. Clerf, 128 S. 10th street, Philadelphia.

Secretary—Dr. Richmond McKinney, 899 Madison avenue, Memphis, Tenn.

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Shea, of Memphis, Tenn., in the Feb. 7, 1931, *Journal A. M. A.*, writes on the management of fractures involving the paranasal sinuses. He discusses in detail the handling of the various types of fractures and has some beautiful X-ray pictures to illustrate his points. He concludes the article with the belief that the rhinologist is best prepared to treat fractures involving the paranasal sinuses and that reduction of the fracture and protection of the sinuses are the underlying therapeutic principles.

Dr. Otto Joachim, of New Orleans, was recently awarded the German Red Cross Medal for his services to German children before and during the war. The German Red Cross Medal is a decoration established since the war and is only awarded for the saving of human life. Germany felt that the yeoman service rendered by Dr. Joachim to the children of that country should not go unrewarded.

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Simpson, of Chicago, in the Jan. 31, 1931, *Journal A. M. A.*, reports on the use of radium in the treatment of hemangioma of the larynx. Hemangioma of the larynx is a rather rare condition, usually congenital, which may remain stationary or grow slowly by the formation of new blood vessels. Generally benign, it may, however, cause death from hemorrhage or suffocation. Simpson reports two cases which he treated with radium, both of which seem to be under perfect control by this therapy.

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The following new officers of the Eastern New York Eye, Ear, Nose and Throat Association were elected at the annual meeting:

President—Dr. Frank M. Sulzman, 1831 Fifth avenue, Troy, N. Y.

Vice-President—Dr. R. H. Seeley, Rutland, Vt.

Secretary-Treasurer—Dr. Arthur F. Holding, 142 Washington avenue, Albany, N. Y.

Time—Third Wednesday of October, November, March, April, May and June.

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O. Jason Dixon, of Kansas City, Mo., in the Feb. 14, 1931, issue of the *Journal A. M. A.*, discusses brain abscess from the otologic viewpoint. He decries the transferring of these patients in hospitals from one service to another and suggests that probably the fear that most patients die prompts the transfer to another service. He states that this fatalistic attitude towards brain abscess is destructive to any progress in the proper management of these cases; he believes that skillful surgery can save many of the cases and quotes the reports of Cushing and Bandy to prove how much can be done to the brain without disturbance of function.

Dixon does not make a plea for the otologist in these cases, but insofar as many of the cases are first seen by the otologist, it behooves him to be familiar with the clinical course of the lesion and to realize how frequently brain abscess exists as a complication of ear infection.

In the discussion of this paper it was brought out from various sources that the best handling of these cases was by close co-operative help of otologist and neurologist.

## THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTOLOGY.

*Meeting of March 13, 1931.*

**Report of a Case of Primary Bulb Thrombosis; Operation Three Years Later; Circumscribed Labyrinthitis; Facial Palsy.** Dr. L. Kend.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Primary Jugular Bulb Thrombosis; Metastatic Abscesses. Report of Case.** Dr. Herman L. Lampe.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Report of a Case of Acute Mastoiditis Complicated by Internal Hydrocephalus.** Dr. Frank C. Carr.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Two Cases with Severe Labyrinth Symptoms Occurring Following O. M. C. C.** Dr. John McCoy.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**O. M. P. C., Mastoidectomy; Septicemia, Jugular Ligation; Recovery. Case Report.** Dr. John A. MacIsaac.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

**Fibrosarcoma of Dura. Middle Fossa; Radical Mastoid Operation. Case Report.** Dr. Edgar M. Pope.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

**Modified Radical Mastoid Operation Followed by Radical Mastoid Operation with Severe intracranial Symptoms. Case Report.** Dr. John McCoy.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

**The Temporal Bone, Its Surgical Anatomy and Variations from the Normal (Lantern Slide Demonstration).** Mr. E. B. Burchell (by invitation).

The pictures of the temporal bones which I am about to throw on the screen tonight are some taken from my collection, the gathering of which covers a period of more than 20 years.

The first picture is that of a disarticulated temporal bone, at birth, showing its three divisions. The petrous pyramid shows a well defined antrum of quite fair size. The round and oval windows are of the same size as those found in the adult. The styloid mastoid foramen is also demonstrated, showing how superficial it is at this period.

Next is the adult bone and its three types, viz., the infantile, the sclerosed and the pneumatic. It will be noted in the infantile type how the middle cranial fossa has a tendency to dip and come into close relation with the mastoid antrum, making the cavity very shallow. In some respects this is also true of the sclerotic type, although in the latter the consistency of the bone is much denser.

In the pneumatic bones we have cells extending high into the squama and far forward into the zygoma. Some specimens show these zygomatic cells extending even to the suture line. Another point of interest here is the thinness of the cortex covering these cells. The temporal ridge is displayed, taking an upward direction after leaving its horizontal course over the bony external meatus. A perpendicular line drawn from the highest point of the temporal ridge through the center of the tip will generally be a line parallel to the sigmoid sinus groove.

In pictures of the petrous pyramid large pneumatic cells were presented to view, extending to the apex underneath the groove for the reception of the

sixth nerve. This is brought out as a point of interest because it demonstrates how infection may travel forward, bringing about paralysis of the abducens and the train of symptoms known as Gradenigo's syndrome.

Still other plates were exhibited of jugular fossae that are extremely deep, and containing dehiscence that communicates with the tympanic cavity through its floor, and still others with dehiscence over the perpendicular course of the seventh nerve just before it reaches its foramen.

In the mastoid tips appeared a number of variations in size and shape. One showed a double tip. Attention was directed to the digastric groove and its path of communication to the styloid mastoid foramen. This, making a groove externally, must form a ridge in the mastoid cavity which should carry one to the facial ridge, which is an extremely valuable point, especially in these highly pneumatic types of bone, in which one is compelled to travel forward behind the facial ridge to remove the bulbar cells which lie underneath the posterior semicircular canal.

Styloid processes of considerable length, one measuring 2¾ inches long, were also demonstrated, together with sinuses that are superficial and very far forward, directly beneath the spine of Henle, making it impossible to reach the mastoid antrum by the ordinary surgical procedure without injuring the vessel.

Finally, there was an exhibit of metal casts of the temporal bone.

**Decompression of the Facial Nerve for Facial Paralysis Following Radical Mastoid Operation. Case Report.** Dr. J. Morrisset Smith.
*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. JOHN MCCOY: In the first place, I would like to ask Dr. Smith if he has had reaction of degeneration in the cases he has operated on.

DR. J. M. SMITH: Had left the meeting.

DR. JOHN MCCOY: In operating on the facial nerve, that is what we have to watch out for. I have operated on a few and did not get good results, for there had been reaction of degeneration before the operation. That taught me that one should make the test before operating.

DR. LAMPE said he was able to remove the clot from the jugular bulb by means of suction. He was rather lucky in this respect. In a number of instances where I have operated on the bulb we have used for a period of several days this suction, to see if we could not remove the clot from the bulb and establish drainage through the inferior petrosal. Perhaps the result of his having this abscess in the elbow was that the blood came through the inferior petrosal and left a large area in the trunk of the jugular vein, which caused a disturbance through the system and caused the abscess to be formed. However, I would not be sure of that, for in cases where I have operated I have had abscess in the elbow. In the cases I have operated I have worked from below up, rather than from the mastoid. The best of the operations from the mastoid side is Whiting's operation, but that is not always practicable. If we have not space through the mastoid tip into the jugular bulb we are liable to strike the facial nerve and get paralysis; whereas, if we come from below we can push aside the facial nerve and reach the bulb from below and open the whole thing and get complete drainage. It is more of an operation than the Whiting but much safer for the facial nerve, unless there is a wide mastoid tip.

I cannot say too much in praise of my friend, Mr. Burchell, who has given us a wonderful demonstration and brought out many important points; but if you can talk with him you will get even more information than from hearing him. If you can go into his laboratory and see him working on these bones you will find it most interesting and instructive.

QUERY: Dr. McCoy spoke of a case with labyrinthine symptoms which had stenosis of the tube. I would like to know if inflation by passing bougies had any effect at all.

DR. MCCOY: The regular treatment by inflation of the Eustachian tube was cut out. In the two cases it seemed to have no effect on the labyrinthine symptoms. I think this is a form of labyrinthitis which takes place in a dry ear—a vascular labyrinthitis, perhaps—which produces these symptoms of nausea, vomiting and dizziness.

## THE NEW YORK ACADEMY OF MEDICINE.

SECTION OF OTOLOGY AND SECTION OF LARYNGOLOGY AND RHINOLOGY.

*Joint Meeting of April 22, 1931.*

**Symposium On Pneumococcic and Streptococcic Meningitis: Otological Aspect.** Dr. Jos. G. Dwyer.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Symposium On Pneumococcic and Streptococcic Meningitis: Rhinological Aspect.** Dr. Lee M. Hurd.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Symposium On Pneumococcic and Streptococcic Meningitis: Prophylaxis and Treatment.** Dr. John A. Kolmer (by invitation).

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. S. J. KOPETZKY: It would not be right to let this audience depart with the impression that meningitis is altogether hopeless. We have had the good fortune tonight to hear from men with a scientific trend of mind, whose statements were well considered and whose conclusions were exceedingly conservative. The trouble with the question of meningitis is that too many generalizations are made about it, and generalizations are useless on this particular subject; for meningitis is not one specific pathological entity, but a generic name for a number of lesions. The meningitis dealt with by Dandy in his book is entirely different from the meningitis whose origin is the ear or the nasal accessory sinuses. An infection of the tissues comprising the meninges, following trauma or a fracture of the skull, differs in nature, course and outcome from the meningitis of hematogenous origin, which is the usual route following infection of the ear or the paranasal sinuses.

Dr. Eggston made a very nice trio of the problems connected with meningitis. His first point, "the source of the infection is unknown," holds the cue to an important fact. Truly, the source of the infection is unknown in a great many instances; but it is known in some; and where it is known there is some chance for instituting real therapeutic methods.

Historically speaking, meningitis was much more prevalent as a sequel to ear diseases in former years than it is today. The reason for this is not a greater success in handling meningitis; but the elimination of a number of condiitions as causative factors. For instance, sinus thrombosis, purulent labyrinthitis, extradural and perisinal abscesses are no longer necessarily forerunners of meningitis. Formerly all cases of the lesions named were potential candidates for meningitis; but they have been removed from the meningitic field to a great extent because the intermediate lesion is now recognized and relieved and the meningitis thereby prevented. In the past year or so, Dr. Almour and myself have had the good fortune to remove another class of cases from the potential meningitis group; i. e., the type of case wherein the infection reaches the meninges through the petrosal tip.

In treating meningitis, one should not work too strictly by routine. The man who has the case originally and who operates on the ear should, by his keen observations at the operating table, be able to recognize the course that the infection is taking toward the meninges, whether the line be through the labyrinth, around or through the perilabyrinthine tissues toward the tip, or whether his operative fields shows him to be dealing with an osteomyelitis. Once all the facts have been observed and recorded, when and if the intra-

cranial infection supervenes, one can explore the route that the infection seems to take at the first signs of intracranial involvement.

These Sections are certainly to be congratulated on the resumés presented tonight. Unfortunately, we cannot exhaust this topic in one evening. The discussion is profitable, however, in that it clears away many misconceptions and gives us at least a starting point. It is worth while if we can prevent event the smallest proportion of cases from developing meningitis.

DR. IRA COHEN: The hour is late and I will say but a few words. They are particularly needed after the hopeless note struck by the last speaker. I approach the subject from the standpoint of the neurosurgeon. As a rule the meningitis that we see are post-traumatic or, fortunately very rarely, post-operative. We are dealing with a condition somewhat simpler than the otologist and, in a way, with a somewhat better prognosis, for, as emphasized by Dr. Kolmer and Dr. Dwyer, in the postotitic meningitis the meninges are constantly fed by infected material. In the post-traumatic cases, in spite of the fact that at times we have a pneumococcus or streptococcus infection, we do see recovery by repeated lumbar punctures. It is possible we would have a recovery without any procedure. I cannot agree with Dr. Dwyer, who believes that lumbar puncture and everything else is useless. Patients with meningitis require the removal of spinal fluid to relieve pressure and to remove from the subarachnoid space the bacteria and their toxins. This removal may be accomplished by laminectomy as done years ago by Horseley and more recently by Spurling, or cisterna drainage as advocated by Haynes and Kopetzky and more recently by Dandy, or lumbar punctures. Spurling's results were not in postotitic cases; they were all stayphlococcus meningitis. Two of the three recoveries reported by Dandy were cases of streptococcus infections, but not postotitic. There is one part of the treatment outlined by Spurling to which I would draw attention. It is based on experimental work by Kubie. He showed that by the intravenous injection of fluids and, more particularly, hypotonic solutions, there is increase in the output of spinal fluid. This increase takes place even with complete block of the ventricular system, so that it must be due to an outpouring from the perivascular spaces. With such outpouring, combined with removal of the spinal fluid, one would get a type of lavage of the subarachnoid space. I, therefore, would advocate drainage, either continuous, or intermittent by lumbar puncture, combined with the continuous administration of glucose solution up to 3,000 to 4,000 c.c. a day. This may be run in at the rate of 35 to 40 drops a minute, which is not fast enough to produce speed shock, and it might be wise for part of the time to have this fluid hypotonic; that is, 2.5 percent glucose or one-half normal saline. By this method we are giving the patient a chance to overcome his infection of the meninges. I will make no reference to any procedures to be carried out on the accessory sinuses or mastoid region, for that is distinctly in the field of the otolaryngologist.

DR. A. A. EGGSTON: My experience with pneumococcic and streptococcic meningitis would allow me to sum up my impressions in three statements, as follows: The mode of infection is unknown; the diagnosis is positive; and the treatment is futile.

My experience as pathologist at the Manhattan Eye, Ear and Throat Hospital for the last 12 years has forced me to this rather pessimistic point of view. However, as I am supposed to discuss these well presented papers, I will make a few rather disconnected remarks. All of us have lately thrown up our hands in despair when the diagnosis of streptococcic or pneumococcic meningitis is made, and our experience with all the methods of treatment diligently and faithfully employed have been of no avail. Diligent working day and night upon many of these patients has resulted in the same fatal termination. However, let us hope the future brings us new methods of treatment that offer more hope.

I believe that the mastoid infections cannot always be blamed as the source of meningeal infections. The disease frequently follows infections in the nasopharynx and nasal sinuses. A simultaneous infection occurs in the ear and the meninges. Because of this dual infection an operation will do no good. At times, of course, the organism may travel through the mastoid cells or circula-

tion and, secondarily, into the meninges. A great percentage of cases of meningitis are secondary to a labyrinthitis. My impression is that few cases of meningitis occur after the mastoid has been operated upon. Most cases begin with a mastoiditis and meningitis. Undoubtedly infected mastoids may affect the meninges. I have seen mastoiditis cases with dirty spinal fluid clear up after a thorough mastoid operation. The fluid is simply a contaminated fluid from an epidural abscess with some inflammation of the meninges by contiguity of tissues. However, these cases are undoubtedly not true meningitis cases. In some cases spinal fluids of 1,500 to 3,000 cells are noted in which the fluid has simply been soiled by leukocytes. It is uncertain to make a diagnosis of meningitis when there are 3,000 or less cells, as quite a few of these cases clear up spontaneously. We have had viable bacteria in the fluid in some of these cases, both by smear and culture, and have had them disappear without the development of a frank meningitis. In several cases this has occurred and subsequently we have found that the infection has localized and an abscess resulted, which has been correctly predicted upon the basis of these observations. I have been struck with the fact that viable hemolytic streptococci may occur in spinal fluid and then disappear. It seems that a favorable tissue susceptibility for the bacteria to take hold is necessary.

I agree with Dr. Kolmer that there is no apparent harm in doing diagnostic lumbar puncture early in these cases, as I have never seen any harm result from this procedure and would not hesitate to advise doing it more frequently.

In the treatment of our cases at the hospital, we have tried all sorts of chemotherapeutic methods: mercurochrome, gentian violet, urotropin, optochin, and the ultimate results have all been discouraging. We have also employed the various methods of drainage, as frequent punctures, laminectomy, cisterna punctures, ventricular punctures and multiple openings of the dura in the mastoid region and base of brain, with no encouraging results.

Personally, I think the various serum injections do harm. The reactions have been very bad and the results poor. The outlook in the treatment of pneumococcic and streptococcic meningitis is one of absolute hopelessness at present. If drainage is done it should be radical. One might remove the entire parietal bone on both sides, leaving a central bridge of bone over the longitudinal sinus, which would relieve the pressure. Some cases get along fairly well for three to four weeks and then suddenly die, which, I think, is due to an involvement of the ventricles and the choroid plexus with a suddenly increased pressure and increased toxemia. Perhaps proper ventricular drainage would be of some help.

Personally, I cannot appreciate the efficacy of intracarotid injections of a small quantity of immune sera. We have transfused many of these patients daily with large doses of blood from donors who have survived a sinus thrombosis and septicemia of either pneumococcus or hemolytic streptococcus infections and have thus obtained a relative amount of immune bodies, greater in the brain and circulation than could be obtained from a few cubic centimeters of immune serum in the carotid. Outside of some general support to the patients, these special transfusions have been of no avail.

# THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

*Regular Meeting, April 7, 1931.*

**Unusual Case of Carcinoma of the Larynx. Case Report.** Dr. Louis H. Clerf.

*(To appear in a subsequent issue of* THE LARYNGOSCOPE.*)*

**Retropharyngeal Abscess; Diagnosis and Treatment.** Dr. W. K. Kistler.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. GABRIEL TUCKER: There are two points in Dr. Kistler's paper that I would like to emphasize. The first is the value of X-ray examination in cases ot retrophayngeal abscess. X-ray examination will reveal caries of the spine, which may be a cause of retropharyngeal abscess. An abscess due to tuberculous caries of the spine should not be drained through the pharynx. X-ray examination by the Pancoast-Pendergrass technique will show definitely the location and extent of the lesion, no matter what its origin. If an opaque foreign body is present, proper localization for its removal will be made by the X-ray examination. Knowledge of the extent of the abscess will aid in the decision as to where and how it should be opened. The second point is the advantage of the "bronchoesophagogoscipc method" of evacuation. I have used this method during the past 10 years in a considerable number of cases with uniformly good results. It prevents aspiration of the pus into the lung after the abscess is opened and the insertion of the bronchoscope prior to evacuation will avoid the necessity of tracheotomy in practically all dyspneic cases. I recall only one case in which it was necessary to open externally the abscess after evacuation by the pharyngeal route. This was a child seen at the University Hospital, in which the infection originated in the nasopharynx and middle ear. A retropharyngeal collection was opened and drained successfully through the pharynx. Superficial glands in the neck broke down and abscesses developed. These were drained externally by Dr. Ravdin, the child making a good recovery after a somewhat delayed convalescence.

**Scarlet Fever-Sinusitis.** Dr. Francis V. Gowen.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. BRICKER: The sinusitis of scarlet fever is no different from that of any other infection. Dr. Gowen failed to mention what I consider an invaluable form of treatment of sinusitis in children, which is most often of the ethmoidal type.

This is suction together with the instillation into the nose of various solutions. First, the nares are cleansed of secretions by suction, then a 1 per cent spray of cocain is used to shrink up the tissue of the nose. In about five minutes suction is again applied by using a Sonnenheim glass nasal suction tip, which removes the secretions from the various sinuses, leaving the nose thoroughly cleansed. The patient is then placed on his back across a bed, with the shoulders well over the edge and the head extended until the bridge of the nose is in a vertical plane. Any of the solutions of the colloidal silver salts or, preferably, a solution of metaphen, 1 to 8/1000th strength, is instilled into each nostril. About a medicine dropper full of solution should be dropped in each side of the nose and the patient kept in the position mentioned for about a minute or two. A sensation of burning in the forehead or eyes will indicate that the patient is in the proper position for effective medication of the sinuses, otherwise the patient has not thrown the head sufficiently back. It is remarkable how the noses of children clear up in a few treatments.

**Neuro-Otologic Examinations in Correlation with Brain Surgery.** Dr. J. Clarence Keeler.

*(Appears in this issue of* THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. MACKENZIE: Dr. Keeler presented a very interesting paper. I feel that he could have done himself more justice had he had more time at his disposal.

All of the labyrinthine tests are not strictly Barany's. I do not wish to take from his credit, for his work was most excellent, particularly regarding the caloric tests. He succeeded in disproving the old theory that heat stimulates and cold inhibits the labyrinthine reactions.

As for horizontal nystagmus, it can be produced by endolymph flow in the external semicircular canal in at least three different ways. First, by syringing the ear with cold water with the head inclined to the opposite shoulder (caloric); second, by turning with the head erect (after-turning nystagmus); third, by endolymph flow produced by compression or aspiration in the presence of a fistula in the external semicircular canal (mechanical). In all three tests there is a consistency of findings; in that, whatever is done to produce endolymph motion in the external or horizontal canal toward the utricle produces a horizontal nystagmus in the opposite direction; whereas, endolymph motion away from the utricle produces a horizontal nystagmus in the opposite direction.

I recall that Dr. Eagleton, when speaking of nystagmus in cerebellar abscess, mentioned the fact that some authors had found nystagmus directed toward the same side, others found it directed toward the opposite side, while still others found it present to one side and later changing to the opposite side, and still others found no nystagmus at all. That there should be a difference of findings on the part of different authors is perfectly logical, for the reason that one happens to see the case earlier, when, because of irritation, the nystagmus is directed toward the same side. Another observer, seeing the same case later, will find the nystagmus directed toward the opposite side because of destruction. The same is true of the nystagmus found in internal ear disease.

In the earlier stages, because of congestion, the nystagmus is directed toward the same side; later on, when there is destruction, it is directed toward the opposite side. Let us cite a case which is not rare: A patient comes with an internal ear involvement, secondary to a middle right ear suppuration. In this early stage the patient manifests a nystagmus toward the affected side; later on, if the labyrinthine involvement becomes more severe, the nystagmus will turn about toward the opposite side. If this same patient should later develop a nystagmus toward the affected side it could not possibly come from an inner ear involvement, but from something deeper; most likely a cerebellar congestion. When the cerebellum on that side becomes destroyed from an abscess the nystagmus will again swing about to the opposite side.

As for Barany's observations in after-turning nystagmus, he made many errors. For instance, when he tells us that after-turning nystagmus after 15 or 20 turns is longer than after 10 turns, he is wrong. Again, he is wrong when he tells us there is no consistency in after-turning nystagmus. I find that there is consistency in the findings and that his inconsistent findings were due to faulty technique. I had occasion to refer to this in Pittsburgh in 1917 at a meeting of the American Academy of Ophthalmology and Otolaryngology.

Many things have been written in the name of science which should never have been written.

There are many pitfalls for those who practice faulty technique. My advice to all young men who are ambitious to do careful work is to believe in the results of his findings if they check up with the experience of others and to believe his findings when they do not check up, so long as he is aware of the fact that his technique is better than that of the other fellow.

**Complete Record of Mastoidectomy Under Local Anesthesia; Demonstrating Also the Tobey-Ayer Test and the Ligation of the Jugular Vein. Recovery (Cinema).** Dr. Henry Dintenfass.

# THE MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

SECTION OF OTOLARYNGOLOGY.

*Meeting of March 13, 1931.*

Dr. John Brown, President, Presided.

**The American Rite, Tonsillectomy.** Dr. W. W. Lewis.

Approaching in extent of practice the Jewish rite of circumcision, tonsillectomy of infants, as practiced in America today, will soon be in the lead. The appearance postoperatively in the tonsillar fossae and pharyngeal walls of much lymphoid tissue would indicate Nature's attempt to replace a very necessary part of the lymphatic system and probably, too, of the internal secretions in children up to the age of puberty. Experimentally, animals deprived of tonsillar tissue show marked debility and anemia. Young humans, too, need protection against infection in the oral cavity. The indications for tonsillectomy universally accepted are: Hypertrophy with obstruction; prolonged local inflammatory disease in the tonsil; glandular dyscrasia; systemic poisoning from focal infection.

Tonsillectomy as a whole problem should be divided into three groups: 1. In infants and near-infants; 2. in children (past infancy) up to the age of puberty; 3. in subjects past the age of puberty. In the third group tonsillectomy is done largely on account of systemic poisoning from focal infection; in the second group, on account of hypertrophy with obstruction and glandular dyscrasia; in the first group, not one of the indications for tonsillectomy enumerated above is the rule.

Tonsillectomy in adults and in youth is seldom done without justification; in children between the age of infancy and puberty, no such certainty of justification can be assumed.

There are two justifiable reasons mainly for tonsillectomy in growing children: glandular dyscrasia and genuine hypertrophy; with a third acceptable indication in cases of long-continued involvement of the cervical glands.

In infants adenoidectomy without tonsillectomy is usually about all that is justified, and then practically only for the purpose of clearing up persistent middle ear infection.

The writer is of the opinion that tonsillectomy in children past infancy has been tremendously overdone and has been distinctly disadvantageous to a large proportion of this group, and that tonsillectomy in infants has seldom been justified but has, generally speaking, been distinctly and entirely wrong.

DISCUSSION.

Dr. J. A. Watson said every laryngologist who has used his powers of observation to the least degree must agree thoroughly with Dr. Lewis so far as the actual phenomena to be observed in very many post-tonsillectomized throats are concerned. All laryngologists have noticed the hypertrophied lymphoid tissue which so frequently studs the pharynx and perhaps even more frequently collects in localized masses behind the posterior pillars. Even those whose attention had never been called to the condition by teachers and associates of earlier days have become thoroughly accustomed to these sequelae of the tonsil operation. It has even given many pause in the career of ruthlessness upon which they may have embarked, since the plausible and perhaps the only possible explanation of the condition is that it is Nature's often rather feeble and rather inadequate attempt to make good the deprivation which was instituted outside her approval of her laws.

Dr. Watson said it is true that one sometimes sees similar masses of lymphoid tissues in throats where no tonsillectomy has been performed, but it is a question whether even here such masses are not compensatory, representing an attempt on the part of Nature to provide adequate means for the performance of function properly belonging to the tonsil, but which through disease they are unable to perform. Naturally here, as elsewhere, one must choose the lesser of two evils. Medical men are still very much in the dark as to the

real function of tonsil and adenoid tissue, however glibly they may talk about them being merely a portion of the lymphatic system and having a protective function to perform; they are still in the dark as to how essential that function is and how effectively it can be performed vicariously by other structures and organs.

Often then laryngologists are, in a sense, between the devil and the deep sea. Dr. Watson said, of course, the indications are sometimes so plain that there can be no question as to the proper course to pursue. There are cases which suffer so markedly from the mere obstruction caused by tonsillar and adenoid masses that it is essential to remove them. There are cases in which a continual appearance of inflammation or of recurrent attacks of inflammation of the tonsils, in spite of measures for the purpose of improving the patient's resistance, make tonsillectomy imperative and this even in spite of the fact that there may be no enlargement sufficient to produce obstruction. The frequent recurrence of tonsillitis, whether in adults or children, and especially when accompanied by cervical adenitis, must certainly be looked upon as a positive indication for tonsillectomy. It is a very nice question, however, he said, as to whether certain contraindications should not at times altogether outweigh the indications themselves for operation.

Dr. Watson stated it was not his purpose now, nor had he time, to go into the pros and cons of the matter, but he heartily agreed with Dr. Lewis that extreme youth (and by extreme youth he meant any age below three or possibly four years) should always incline one to ultraconservatism. He also felt it is true even yet that many cases of chronic tonsillitis, even those with acute exacerbations, go uncared for with very great detriment to the patient's health and well-being. He feared, however, that the converse is at least just as true and that far too many tonsillectomies have been performed on young children in whom time, fresh air, good food, sunlight and codliver oil would have worked wonders and without the production of accessory and often even more annoying masses of lymphoid tissue.

Dr. Watson was of the opinion that the pediatricians, rather than the laryngologists, are the greatest offenders in this respect. Often they bring too great pressure to bear upon the men whose work it is to operate, insisting that such and such a case should be tonsillectomized. True, they are often (like the laryngologists) at their wit's end to know what to do with given cases, and it is all too easy to "pass the buck." Dr. Watson felt strongly, and said he had made his feeling manifest in this Society before, that very many pediatricians are altogether too radically inclined in the matter of laryngological and rhinological operations. He had ben urged by pediatricians to remove adenoids from the throats of three-month-old babies. Once, to his sorrow, he complied, only to find there were no adenoids at all and that the child was a victim of hereditary syphilis. And a woman had told him just the other day that she was going to bring in her baby of six months of age; a prominent pediatrician having told her that the child had been born with adenoids. Dr. Watson said he doubted very much if a child is ever born with adenoids, in the ordinary sense of the word adenoids; that is to say, with hypertrophied masses of lymphoid tissue in the nasopharynx.

Dr. Laura Lane stated there is one phase of this subject which had not been discussed here tonight and which she believed has some importance for the eye, ear, nose and throat specialist; namely, the relation of the reticuloendothelial system to the tonsil. A great deal has been written about this system, but so far it does not appear to have been much considered by any of those working in this field.

She stated that the reticuloendothelial system can be easily demonstrated by certain vital stains. The portions of the body which contain the cells of this system in largest number are the liver, spleen lymphatics and bone marrow. Nearly every tissue of the body has a few of these histocyte cells. The tonsil, being a part of the lymphatic system, contains many of these so-called histocyte cells. These cells have a phagocytic action, they destroy bacteria, toxins and broken-down products. The tonsil is placed in the throat in such a position that it acts as an organ of first defense against infection, and it gains this power largely through this reticuloendothelial system. If it is removed promiscuously, an important defense of the body is destroyed.

She was of the opinion that the eye, ear, nose and throat men must consider these histocytes in their work. The reticuloendothelial system is beginning to be considered of importance in eye work, and in the next few years the nose and throat men will have to pay more attention to it.

The second point she wished to bring out in connection with this subject related to the mode of living, particularly in this country and in Europe. The diet in this country is largely carbohydrate, because carbohydrate food is one of the cheapest forms of energy available to us, and it is quite easily prepared. Pfannenstiel and Scharlau, Mellanby and Green, and others, have shown that infections can be influenced by the use of fat soluble vitamin A. The addition of vitamin B in conjunction with vitamin A appears to hasten the healing process. Carbohydrate food contains little A and much of the B is lost in cooking. The body, under present living conditions, is generally low in calcium, and calcium is not to any great extent found in carbohydrate foods. All this has to do with the problem of lymphoid hyperplasia and the infection which is found in the tonsils.

Dr. John Brown thought that Dr. Lane's remarks in this connection would impress a good many present as they had him; *i. e.*, that, as specialists, oculists and laryngologists do not know enough general medicine, and especially physiology. He was of the opinion that low calcium metabolism and the relation between the vitamins and the calcium had a great deal to do with lowering the infective threshold of the patient.

Dr. Lewis (in closing) said that Dr. Watson mentioned the lymphatic tissue in throats that had not been tonsillectomized, and he felt that that is true, but in all such throats there will be found a genuine hypertrophy of the tonsil so thoroughly infiltrated with fibroid tissue that in fact the condition nearly equaled, through incompetency of the glands, a tonsillectomized throat. The tonsils which he meant, and the point he wished particularly to bring out in his paper, were the tonsils in very young children, and the practice of taking out tonsils in infants and near-infants.

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## THE NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

*Meeting of April 20, 1931.*

Dr. Hilliard Wood, Chairman, Presided.

**New Growth in Socket of Enucleated Eye.** Dr. W. G. Kennon.

Dr. W. G. Kennon reported the case of R. T., age 22 years, who, 14 years before, had been struck in the left eye by an exploding fuse cap. There had been several subsequent operations, presumably for traumatic cataract. The eye had been acutely inflamed at intervals during the six years previous to Dr. Kennon's examination. At the time of examination the eye was inflamed. The cornea presented a scar in the upper quadrant and there was a hole in the iris above "from injury, or from operation." There was a marked membranous cataract. Light perception was questionable and projection was absent. The right eye showed slight photophobia and lacrimation. Vision in the right eye was 20/20. Enucleation of the left eye was performed.

Nine years later the patient returned, complaining of inability to wear an artificial eye. The artificial eye was pushed upward and forward, apparently from a subconjunctival growth in the lower fornix. X-ray for foreign body was negative. Under local anesthesia the conjunctiva over the growth was incised, and what appeared to be a fatty tumor about 3 x 5 m.m. in diameter was removed.

Dr. Wm. Litterer reported upon histologic study that the nodule consisted of nerve tissues with some fat and fibrous growth, containing numerous blood vessels and blood space. His diagnosis was "fibroneuroma with beginning angiomatous changes."